



Postage And Fees Paid  
U.S. International Trade Commission

UNITED STATES  
INTERNATIONAL TRADE COMMISSION  
WASHINGTON, D.C. 20436

OFFICIAL BUSINESS

ADDRESS CORRECTION REQUESTED

ADDRESS CHANGE  
☐ Remove from List  
☐ Change as Shown  
Please detach address  
label and mail to address

ITC 1  
17  
332-  
160

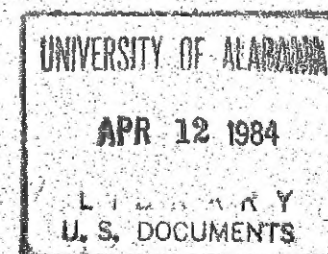
# A COMPETITIVE ASSESSMENT OF THE U.S. VIDEO GAME INDUSTRY

Docs. Expediting



ASSESSMENT

Report on Investigation  
No. 332-160 Under Section  
332(b) of the Tariff Act  
of 1930



USITC PUBLICATION 1501

MARCH 1984

UNIVERSITY OF ALABAMA

Interlibrary Loan

Trans. #: 548922

Title A competitive assessment of the U.S. video  
game industry : report on investigation no. 332-160  
under section 332(b) of the Tariff Act of 1930.  
Call # ITC 1.12:332-160 Annex

Patron:  
Due: 06/09/17 Pieces: 1

ILL# 176227409

Loaned To: GAT

ILL Office Hours: Monday - Friday, 8:00am -  
4:45pm

Phone: 205-348-7368 [gmarcks@ua.edu](mailto:gmarcks@ua.edu)



# UNITED STATES INTERNATIONAL TRADE COMMISSION

## COMMISSIONERS

Alfred E. Eckes, Chairman

Paula Stern

Veronica A. Haggart

Seeley G. Lodwick

---

Kenneth R. Mason, Secretary to the Commission

---

This report was prepared principally by

Ralph J. Watkins

General Manufactures Division

---

Office of Industries  
Norris A. Lynch, Director

---

Address all communications to  
Office of the Secretary  
United States International Trade Commission  
Washington, D.C. 20436

i

## PREFACE

On February 25, 1983, on its own motion and in accordance with section 332(b) of the Tariff Act of 1930 (19 U.S.C. 1332(b)), the United States International Trade Commission instituted investigation No. 332-160 to assess the current and prospective competitiveness of the U.S. video game industry. This study analyzes the rapid growth of the U.S. industry, the importance of overseas assembly of video games, and markets for those games in the United States, Europe, and Japan. The study also assesses conditions of competition among U.S. producers and major foreign producers. Notice of the investigation was given by posting copies of the notice of investigation in the Office of the Secretary, U.S. International Trade Commission, Washington, D.C., and by publishing the notice in the Federal Register of March 22, 1983 (48 F.R. 9968) (app. A).

In the course of this investigation, the Commission sent questionnaires to 88 producers and 26 importers of video games and components. Responses were received from 54 producers, 31 of which also imported video games and/or components, and 17 additional importers. The respondents are believed to have together accounted for over 90 percent of the value of U.S. producers' shipments of video games and components and over 95 percent of U.S. imports in 1982. Information was also obtained from published sources, from interviews with corporate executives representing producers, importers, and distributors of video games, from the Commission's files, and from other sources.



## CONTENTS

	<u>Page</u>
Preface-----	i
Executive Summary-----	ix
Description and uses:	
The product-----	1
Coin-operated video games-----	1
Video game systems and game software-----	1
Hand-held video games-----	2
Manufacturing process:	
Coin-operated video games-----	3
Video game systems and cartridges-----	4
Hand-held video games-----	4
U.S. tariff treatment-----	4
Profile of the U.S. industry:	
Producers:	
Coin-operated video games-----	7
Video game systems-----	9
Game software-----	11
Hand-held video games-----	11
Production, capacity, and capacity utilization:	
Coin-operated video games-----	11
Video game systems-----	12
Game software-----	12
Hand-held video games-----	13
Producers' shipments and exports-----	13
Coin-operated video games-----	18
Video game systems-----	19
Game software-----	20
Hand-held video games-----	21
Inventories:	
Coin-operated video games-----	21
Video game systems-----	22
Game software and hand-held video games-----	22
Employment-----	22
Coin-operated video games-----	25
Video game systems-----	25
Game software-----	26
Hand-held video games-----	26
Capital expenditures-----	26
Research and development expenditures-----	26
Coin-operated video games-----	26
Video game systems-----	27
Game software-----	29
Hand-held video games-----	29
Income and expenditures from the licensing of copyright video games-----	29
Major foreign markets and competitors:	
Japan:	
Coin-operated video games-----	30
Video game systems and software-----	31
Hand-held video games-----	31

## CONTENTS

	<u>Page</u>
Major foreign markets and competitors--Continued	
Hong Kong-----	32
Video game systems and software-----	32
Hand-held video games-----	32
Taiwan:-----	33
Coin-operated video games-----	33
Video game systems and software-----	33
Europe:-----	34
Coin-operated video games-----	34
Video game systems-----	35
Game software-----	35
Hand-held video games-----	35
Other markets-----	36
U.S. imports:-----	36
Importers-----	36
Coin-operated video games-----	36
Video game systems-----	36
Game software-----	36
Hand-held video games-----	36
Imports for consumption-----	37
Coin-operated video games-----	39
Video game systems-----	39
Game software-----	40
Hand-held video games-----	40
Imports under TSUS item 807.00-----	40
The U.S. market:-----	
Description of the market:-----	42
Coin-operated video games-----	44
Video game systems-----	45
Game software-----	46
Hand-held video games-----	46
Consumption-----	46
Coin-operated video games-----	48
Video game systems-----	49
Game software-----	49
Hand-held video games-----	49
Factors of competition-----	50
Providing games with player appeal-----	51
Research and development-----	52
Licensing-----	52
Production technology:-----	53
Coin-operated video games-----	53
Video game systems-----	53
Game software-----	53
Hand-held video games-----	53
Marketing:-----	
Coin-operated video games:-----	53
Distance from the market-----	54
Channels of Distribution-----	54
Other-----	54

## CONTENTS

	<u>Page</u>
Factors of competition--Continued	
Product quality and price:-----	
Coin-operated video games-----	54
Video game systems and game software-----	56
Hand-held video games-----	58
Future trends:-----	
Coin-operated video games-----	58
Video game systems-----	59
Game software-----	59
Hand-held video games-----	60
Appendix A. Notice of investigation-----	61
Appendix B. Video games and components: nontariff barriers experienced by U.S. producers in foreign markets-----	65
Appendix C. Assessment by U.S. producers and importers of the competitive position of U.S.-made video games and components versus that of foreign-made products-----	71

## Figures

1. Video games: U.S. producers' shipments, imports for consumption, apparent consumption, and exports of domestic merchandise, 1978-83-----	15
2. Video games and components: U.S. exports of domestic merchandise, by principal markets, 1978-83-----	17
3. Video games and components: Average number of production and related workers, 1978-82, January-June 1982, and January-June 1983-----	24
4. Video games and components: Investment in domestic operations by U.S. producers, 1978-83-----	28
5. Video games and components: U.S. imports for consumption, by principal sources, 1978-83-----	38

## Tables

1. Video games and parts thereof: U.S. rates of duty, present and negotiated, by TSUS items-----	6
2. Coin-operated video games: U.S. production, production capacity, and capacity utilization, 1980-82, January-June 1982, and January-June 1983-----	12
3. Video games and components: Shipments of domestically produced video games and components in the U.S. market and U.S. exports of domestic merchandise, 1978-82, January-June 1982, and January-June 1983-----	14
4. Video games and components: U.S. exports of domestic merchandise, by principal markets, 1978-82, January-June 1982, and January-June 1983-----	16
5. Coin-operated video games: Shipments of domestically produced video games in the U.S. market and U.S. exports of domestic merchandise, 1978-82, January-June 1982, and January-June 1983-----	18



## CONTENTS

	<u>Page</u>
6. Coin-operated video games: U.S. exports of domestic merchandise, by principal markets, 1980-82, January-June 1982, and January-June 1983-----	19
7. Game software: U.S. exports of domestic merchandise, by principal markets, 1980-82, January-June 1982, and January-June 1983-----	20
8. Coin-operated video games: U.S. producers' inventories as of Dec. 31 of 1980-82, June 30, 1982, and June 30, 1983-----	21
9. Average number of employees, total and production and related workers employed in establishments producing video games and components, by types, 1978-82, January-June 1982, and January-June 1983-----	23
10. Video games: Man-hours worked by production and related workers, by types, 1978-82, January-June 1982, and January-June 1983-----	25
11. Coin-operated video games: Average number of man-hours worked per unit produced, 1978-82, January-June 1982, and January-June 1983-----	25
12. Video games and components: Capital expenditures for U.S. facilities used for production, warehousing, and marketing, by types, 1978-82, January-June 1982, and January-June 1983-----	27
13. Video games and components: Expenditures for research and development, by types, 1978-82, January-June 1982, and January-June 1983-----	27
14. Income and expense from the licensing of rights to copyrighted video games, 1978-82, January-June 1982, and January-June 1983-----	29
15. Video games and components: U.S. imports for consumption, by principal sources, 1978-82, January-June 1982, and January-June 1983-----	37
16. Video games and components: U.S. imports for consumption, by types, 1978-82, January-June 1982, and January-June 1983-----	39
17. Video games and components: U.S. imports under TSUS item 807.00, by principal sources, 1980-82, January-June 1982, and January-June 1983-----	41
18. Video games: U.S. producers' shipments, imports for consumption, apparent consumption, shipments of imported video games, and domestic consumption, 1978-82, January-June 1982, and January-June 1983-----	47
19. Video games: Apparent U.S. consumption, by types, 1978-82, January-June 1982, and January-June 1983-----	48
20. Assessment by U.S. producers and importers of the overall competitive position of U.S.-made video games and components versus foreign-made products during 1978-83, by types-----	51
B-1. Video games and components: Number of responses indicating non-tariff barriers experienced by U.S. producers in foreign markets, by specified barriers, 1978-83-----	67
C-1. Coin-operated video games: Assessment by U.S. producers and importers of video games and components of the competitive position of U.S.-made coin-operated video games versus foreign-made products during 1978-83-----	73
C-2. Video game systems: Assessment by U.S. producers and importers of video games and components of the competitive position of U.S.-made video game systems versus foreign-made products during 1978-83-----	74

## CONTENTS

	<u>Page</u>
C-3. Home computers: Assessment by U.S. producers and importers of video games and components of the competitive position of U.S.-made home computers versus foreign-made products during 1978-83-----	75
C-4. Video game software: Assessment by U.S. producers and importers of video games and components of the competitive position of U.S.-made video game software versus foreign-made products during 1978-83-----	76
C-5. Hand-held video games: Assessment by U.S. producers and importers of video games and components of the competitive position of U.S.-made hand-held video games versus foreign-made products during 1978-83-----	77
C-6. Video game consoles: Assessment by U.S. producers and importers of video games and components of the competitive position of U.S.-made video game consoles versus foreign-made products during 1978-83-----	78
C-7. Video game controllers: Assessment by U.S. producers and importers of video games and components of the competitive position of U.S.-made video game controllers versus foreign-made products during 1978-83-----	79
C-8. Game logic boards: Assessment by U.S. producers and importers of video games and components of the competitive position of U.S.-made game logic boards versus foreign-made products during 1978-83-----	80
C-9. Custom-made video game computer chips: Assessment by U.S. producers and importers of video games and components of the competitive position of U.S.-made custom-made video game computer chips versus foreign-made products during 1978-83-----	81
C-10. Keyboards for home computers: Assessment by U.S. producers and importers of video games and components of the competitive position of U.S.-made keyboards for home computers versus foreign-made products during 1978-83-----	82
C-11. Disc drives for home computers: Assessment by U.S. producers and importers of video games and components of the competitive position of U.S.-made disc drives for home computers versus foreign-made products during 1978-83-----	83
C-12. Cassette recorders for home computers: Assessment by U.S. producers and importers of video games and components of the competitive position of U.S.-made cassette recorders for home computers versus foreign-made products during 1978-83-----	84



## EXECUTIVE SUMMARY

Video games were first introduced in 1972 as "T.V. games." Coin-operated versions which supplemented the more traditional pinball machines were introduced the following year. Although demand proved to be strong for both coin-operated and home video games in the immediately ensuing years, the most rapid growth in the industry occurred during 1979-82, as U.S. consumption rose from \$215 million (1978) to \$3.7 billion (1982). Developments giving impetus to the rise in consumer interest in video games were the initial sales of programmable home video games (employing game cartridges) in 1977, the introduction of hand-held video games in 1978, major technical improvements in coin-operated video games in 1979 (making it possible to increase the level of difficulty of game play in phases), the widespread licensing of popular arcade video games for use in programmable home video games in 1980, and the evolution of video games into home computers during 1982 and 1983.

The market for video games more than doubled in 1980 and again in 1981, and continued to expand in 1982 despite the recession. Many companies in the toy, game, record, and movie businesses responded to a significant loss in their share of the consumer's entertainment dollar to video games by entering some aspect of the video game business themselves. As new companies entered the market and competition intensified in terms of price, quality, and product development, U.S. firms increased their use of foreign production and assembly facilities.

U.S. consumption in the first six months of 1983 was 27 percent less than in the same period of 1982. This industry is still in a dynamic state as new laser disc games are being introduced and the video game systems merge with home computers.

The major findings of this study are summarized below.

1. Structure of the U.S. and foreign industry

- o The U.S. video game industry is highly internationalized, composed of both U.S. and foreign-owned companies, and makes extensive use of foreign components and offshore production facilities.

The establishment of foreign production facilities by U.S. manufacturers, the operation of domestic manufacturing plants by foreign-owned companies, and worldwide sources of components for both U.S. and foreign firms have internationalized the U.S. video game industry. Many of the video games popular in the United States are produced domestically under license from copyright holders in Japan. The license agreements sometimes require logic boards (programmed integrated circuits assembled on printed circuit boards) for arcade video games to be imported from the copyright holders. Furthermore, several Japanese coin-operated video game manufacturers have production facilities in the United States. Similarly, many U.S. and Japanese producers of such games have joint ventures or license agreements with assemblers of coin-operated video games in Europe. U.S. producers export some electronic components for coin-operated video games to manufacturers in



Japan. U.S. producers of home video games, cartridges, and hand-held video games make extensive use of overseas assembly operations and imported components. The largest offshore producers of these games are either owned or contracted by U.S. producers.

- o A relatively small number of firms dominate the production of video games in the United States.

Although 16 firms manufactured coin-operated video games in 1982, the three largest companies together accounted for over one-half of U.S. production. Four or fewer firms each also accounted for the majority of home video games, home computers, video game cartridges, and hand-held video games produced in the United States.

- o U.S. employment in the video game industry grew from 2,249 to 8,758 during 1978-82 and continued to expand in the first half of 1983.

U.S. employment of production and related workers in the video game industry nearly quadrupled during 1978-82, from 2,249 to 8,758. Despite a 22-percent reduction in total producers' shipments (to both the domestic and foreign markets) in January-June 1983 compared with those in the January-June 1982, employment of production and related workers in the video game industry increased by 13 percent to 9,225. Increased employment in the production of video game software and home computers in 1983 more than offset decreases in the video game system and coin-operated video game segments of the industry.

- o Investment by U.S. producers of video games in their domestic operations increased each year during 1978-82.

The expenditures by U.S. producers of video games in their domestic operations for capital investment, research and development, and the rights to produce copyrighted games increased each year during 1978-82, from \$19 million in 1978 to \$262 million in 1982. Such investment rose by 73 percent in January-June 1983 over that in January-June 1982 to \$186 million.

## 2. The world market

- o Manufacturers based in the United States, Japan, and Taiwan supply most of the world's video games.

Producers based in the United States and Japan develop almost all of the world's copyrighted video games. They program most of the game logic boards available to the rest of the world. Cabinets for most arcade video games are produced in local markets and assembled with game logic boards completed in the United States, Japan, and Taiwan. The U.S. market for video game systems is supplied by U.S.-based companies; the European market, by a local manufacturer and U.S.-based companies; and the Japanese market, by local producers and a U.S. company. These companies supply systems hardware as well

as the bulk of the game software. The U.S. market for hand-held video games is supplied by domestic sources and imports from Hong Kong, whereas the European market is supplied by imports from the United States, Japan, and Hong Kong, and the Japanese market, by local producers and U.S.-based companies which manufacture the games in Hong Kong.

## 3. The U.S. market

- o U.S.-based firms play a dominant role in the domestic market for video game products.

U.S.-based firms supplied over 95 percent of the market for video games in 1982, accounting for 82 percent of the value of apparent U.S. consumption of coin-operated video games, 99 percent of the hand-held video games, and over 99.5 percent of the video game systems, home computers, and game software. Although all major U.S. companies develop copyrighted video games, none of the firms manufacture products in all of the categories.

- o The market for video game systems expanded in 1982 despite the recession.

Apparent U.S. consumption of video game systems grew by 75 percent in 1982 over 1981 while most other industries were experiencing slower sales. Industry experts attribute this market growth to an increased consumer tendency to entertain at home during the uncertain times of the economic downturn. The options that utilized existing televisions, such as connections for video games, home computers, and video recorders, were particularly attractive.

- o U.S. consumption of arcade video games and video game systems peaked in 1982.

Apparent U.S. consumption for all video games expanded from \$215 million in 1978 to \$3.7 billion in 1982, but was down by 27 percent in January-June 1983 versus the similar 1982 period. The decline in arcade video games was primarily attributable to reduced player interest as fewer hit games were introduced. This reduction in new game innovation was linked to lower product development expenditures by domestic manufacturers as the profit margins per machine were eroded by the increasing penetration of relatively low priced game machines from Taiwan. Three factors contributed to the downturn in the video game system market in 1983: (a) affluent families with teenage males, the initial target market, neared saturation in 1982; (b) there was a dearth of hit games necessary to trigger consumer interest; and (c) sales were lost to computer manufacturers as they slashed prices and promoted the game-playing features of their home computers. Although retail sales of game software continued to grow in 1983, producers' shipments fell as the market absorbed the huge inventories which went unsold during the Christmas season of 1982.

- o The markets for video game systems and home computers have merged.

All of the principal suppliers of video game systems market home computers, and some of them also offer units to expand their video game



systems into computers. In doing so, they are competing head on with companies more experienced in the computer field. The ensuing price war has diminished the profit margins of nearly all of the competitors in the video game system/home computer market.

#### 4. U.S. imports

- o U.S.-based firms accounted for 80 percent of U.S. imports of video games and components in 1982.

U.S.-based firms which perform at least some manufacturing operations in the United States accounted for 80 percent of U.S. imports of video games and components in 1982. Furthermore, foreign-based companies which produce or assemble video games in the United States accounted for 18 percent. Imports containing some U.S.-made components accounted for 64 percent of total U.S. imports in 1982. Although all U.S.-based suppliers of arcade video games perform all of their production domestically, most incorporate varying quantities of imported game logic boards in accordance with licensing agreements with Japanese copyright holders. Despite the lack of foreign-based suppliers of game software, a significant portion of game cartridges in the U.S. market are assembled in low-wage-rate countries.

- o The share of apparent U.S. consumption of video games accounted for by imports declined steadily during 1979-83.

The rapid growth in imports of video games during 1979-82 (from \$170 million to \$576 million) did not keep pace with the even faster expansion in U.S. producers' shipments to the U.S. market (from \$218 million to \$3.1 billion). The share of apparent consumption accounted for by imports dropped from 44 to 16 percent during the period as the role of hand-held video games, (the majority of which are imported) became overshadowed by arcade video games and programmable home video games. Import penetration declined further to 12 percent in January-June 1983 as imports fell faster than producers' shipments.

#### 5. Factors of competition.

- o The ability to create or license video games with a high degree of play appeal is critical for success.

In each category of video game product, the ability of a firm to create or obtain licenses for games which will appeal to large numbers of players is the key to success in the industry. Producers in the United States and Japan are the leaders at creating popular games.

- o Finished arcade video games from legitimate foreign sources are not competitive in the U.S. market.

High transportation costs of ocean freight from Japan keeps the price of imported finished arcade video games competitive with that of U.S.-made

games. However, the long lead time involved in supplying U.S. customers makes imported, finished, coin-operated video games noncompetitive with the domestically produced games. In order to gain a share of the market, several Japanese producers established manufacturing facilities in the United States to assemble Japanese-made game logic boards with locally made cabinets. Some Japanese producers limit their U.S. activities by only licensing the rights of their game copyrights to U.S. producers.

- o Copyright infringing of coin-operated game machines and game software has been substantial and harmful according to the domestic industry.

Arcade game manufacturers responding to the Commission's questionnaire cited copyright infringement for substantial loss of sales, with infringers typically supplying 30 percent of the market for popular games. By avoiding research and development expenses and licensing fees, importers of infringing games from Taiwan and other sources are allegedly able to sell counterfeit arcade video games at 30 to 40 percent less than legitimate producers. Reduced revenues and unit profit margins of legitimate producers have reportedly reduced new product development efforts, contributing to the recent industry decline. Software infringers import game logic boards rather than complete games to circumvent detection by the U.S. Customs Service rather than to reduce costs.

- o The introduction of conversion kits has enabled many marginal arcade operators to stay in business.

By marketing conversion kits (the programmed electronic components and artwork which differentiate one game from another), subsidiaries of Japanese producers have enabled many financially marginal arcade video game operators to stay in business. U.S. producers were slow to market conversion kits, thus allowing the Japanese subsidiaries to increase their share of the market.

- o Several factors discourage foreign competition in the market segment for video game systems.

There are no foreign companies operating in the domestic market for video game systems. U.S. firms have assumed a dominant position through the marketing of popular games and through product innovations. U.S. producers have an advantage over foreign manufacturers in economies of scale, strong distribution networks, experience in R. & D., and the quantity and reported quality of games available from software companies that are designed specifically for U.S. hardware. Furthermore, since some of these U.S. companies perform most of their manufacturing operations in Hong Kong and Taiwan, potential foreign competitors do not have lower labor costs in their favor.

- o Domestic manufacturers of game cartridges and discs are unchallenged by foreign-based producers.

U.S. producers or assemblers of game cartridges and discs have the advantages over potential foreign competitors of economies of scale, affiliations with hardware producers, technological experience, proximity to the



market, and a lack of language or cultural barriers. Furthermore, several domestic software designers already assemble cartridges in low-wage-rate countries to minimize labor costs.

- o Price and quality are both important in the hand-held video game market segment.

Foreign producers of hand-held video games have gained a substantial share of the U.S. market through lower prices vis-a-vis those of domestic competitors. U.S. firms, however, still supply over one-half of the market, due principally to the superior graphics, sound, and play action of U.S. games.

#### 6. Future trends

- o Laser disc video games are expected to rejuvenate the coin-operated video game industry.

The introduction of new arcade video games employing laser disc technology is expected to bring life back to the industry. However, some undercapitalized arcade operators will probably continue to go out of business. It is anticipated that the concept of replacement laser discs will reduce the industry's costs.

- o The video game system and game cartridge industries will most likely be absorbed by the home computer industry.

Only video game manufacturers which are successful at marketing home computers are expected to survive the merger of the video game system and the home computer markets. Similarly, game cartridge manufacturers must explore applications programs to maintain their reputation and marketability.

- o The hand-held video game market will be limited.

Industry sources believe the market for hand-held video games will remain relatively stable with peak sales occurring during the Christmas season. This is due primarily to the proliferation of game-playing home computers.

## DESCRIPTION AND USES

### Product

Video games are electronic games which are displayed on video screens. There are four aspects to any video game: one is software and the other three are hardware. The term software has three usages. One usage refers to the actual intelligence and concept which make up a computer or game program. A second usage refers to the integrated circuits or logic board on which the game program is stored. A third usage, which will be employed frequently in this report, refers to cartridges and discs which carry game programs. The hardware consists of the video screen which displays the game, the controllers which control the action in the game, and the device which transmits the message from the logic board and the controllers to the video screen. Video games are available in three basic hardware formats: coin-operated video games, video game systems (including home computers), and hand-held video games. Logic boards programed with game software can be hard wired to the hardware or cartridges housing game logic boards or computer discs programed with video games can be inserted into video game consoles or home computers.

### Coin-operated video games

Coin-operated video games, also called arcade video games, consist of a cabinet, usually of wood; an integral monitor, typically a cathode ray tube (CRT) with a 19-inch screen; a game logic board, consisting of integrated circuits and other electronic components assembled to a printed circuit board; a control panel; and wire cables, called harnesses, which link the logic board, control panel, and video screen. Some recently introduced arcade games employ a laser disc and laser disc player as well as a logic board. Coin-operated video game machines are usually in the form of arcade-style uprights, but are also made in cocktail table, table top, and bar top styles. Although some gambling machines have similar features, they are not considered to be video games.

### Video game systems and game software

Video game systems, also called home video games, usually consist of a game console and game controllers. The console, also referred to as a game player or master unit, is the central unit to which the game controllers are attached. Cables connect the console with any television or computer monitor, which serve as a display screen for the game. Game controllers can be an integral part of the console (hard wired) or they can be connected by cables. Typical types of controllers are push buttons, joy sticks, X-Y controllers, roller controllers, steering wheels, touch pads, and paddle controllers.

First generation video game systems were dedicated to playing a single set of games. The game logic boards were hard wired to the console. The advent of programmable video game consoles quickly made dedicated video games archaic. Cartridges--plastic boxes housing game logic boards--are inserted into the console of a programmable video game system.



Various peripherals can be added to recent generations of video game systems. Additional memory can be added to the console to allow for the play of game cartridges with more sophisticated graphics, sound, and play action, requiring more memory than the original system was designed to accommodate. Voice synthesis modules enable the console to play cartridges programmed with games which "talk" to players. System changers (or adaptors) which attach to the console permit one system to play cartridges designed to be used with another system's hardware. A number of additional components--computer expansion modules, keyboards, disc drives, cassette recorders, and printers--can be attached to the console, allowing the system to function as a home computer.

Industry analysts estimate that between 60 and 80 percent of software sold for use with home computers (personal computers retailing for \$800 or less during 1978-83) are programmed with games. <sup>1/2/</sup> Such home computers are used chiefly as sophisticated video game systems and will be considered to be video game hardware for the purposes of this study. <sup>3/</sup> Conversely, video game systems have added the ability to perform computer applications not related to games. Some home computers are designed to accept cassettes or discs instead of cartridges. However, since cassettes and discs are easier to copy than cartridges, many license holders of copyrighted games make their software available only in the form of cartridges.

A small portion of video game systems contain integral video screens hard wired to the console. These screens are usually thin and based on vectortech technology rather than employing a CRT.

#### Hand-held video games

Hand-held video games are portable, battery-operated, self-contained games that usually employ light-emitting diode (LED) or liquid crystal display (LCD) screens. A second generation of hand-held video games evolved into tabletop video games. However, these similarly self-contained, battery-operated units will be considered together with hand-held games for this report. Although the bulk of hand-held video games are dedicated (hard-wired games cannot be replaced with new games), some programmable models have been developed which use very thin cartridges.

<sup>1/</sup> Laura Landro, "Paramount Pursues New Markets as Changes Confront Movie Firms," The Wall Street Journal, May 25, 1983.

<sup>2/</sup> The lower limit of the retail price of personal computers used chiefly in business applications declined below \$800 in the latter half of 1983 and is expected to continue to fall.

<sup>3/</sup> Gary Putka, "Spotting Which Electronic Games are Hot at Chicago Show Could Put Zip in Stocks, Too," The Wall Street Journal, June 3, 1983.

#### Manufacturing Process

##### Coin-operated video games

The most expensive aspect of producing an arcade video game is the manufacture of the logic board. It accounts for 33 percent of the direct cost of producing a typical coin-operated video game machine; the monitor accounts for 23 percent; the cabinet and wire cables, 12 percent; the control panel, 7 percent; and other raw materials, 12 percent. Labor and overhead account for only 12 percent of the direct costs. <sup>1/</sup>

The game logic board carries the computer memory that distinguishes one game from another. Each logic board has two types of memory circuits: EPROM (erasable programmable read only memory) and RAM (random access memory). An EPROM is an integrated circuit containing a processed silicon chip. The integrated circuit includes transistors, resistors, and diodes, which have been programmed for the storage and retrieval of information by interconnecting the components in a defined logical pattern. The integrated circuit also usually includes a dual end line carrier 1/2 inch by 1-1/4 inches and 3/16 inch thick. The carrier usually has 12 metal prongs on each of its 2 long sides to facilitate insertion onto a printed circuit board. The chip is usually wire bonded to the prongs (lead frames) of the carrier. The entire program for an arcade game usually requires between 5 and 14 EPROM's. Each EPROM has a discrete memory storage capacity. A small glass window is in the middle of the top of each EPROM. Removing the gummed label, which covers the window, and exposing it to ultraviolet light will erase the program on the EPROM and allow it to be reprogrammed.

EPROM's or Read Only Memories (ROM's) (programs for the latter cannot be erased) control how the game is played. On the other hand, RAM's can have memory inserted or withdrawn at any time. RAM's are used for such purposes as recording high scores, initials of players, self-diagnosis, and volume of coins received. Arcade games seldom contain more than 2 RAM's. A programmable read only memory (PROM) acts as the microprocessor (also called a central processing unit (CPU)) and coordinates the functioning of the EPROM's and RAM's.

The largest coin-operated video game manufacturers make printed circuit boards in a highly precise and automated process utilizing computer controlled drilling, routing, plating, laminating, chemical treating, lithographic etching, and testing. Unprogrammed integrated circuits are usually purchased from domestic suppliers (which may or may not have produced the integrated circuits in the United States) and then programmed by the arcade video game producers. Sequencing machines arrange the components in order and automatic insertion machines stuff (insert) the boards with RAM's, PROM's, EPROM's and other electronic components automatically. Only oversized components such as large capacitors, connectors, and power transistors, as well as specialized integrated circuits, need to be inserted by hand. The leads of such hand-inserted components extending through the printed circuit board are trimmed manually before the entire stuffed board undergoes wave soldering.

<sup>1/</sup> Christopher D. Kirby, The Video Game Industry: Strategic Analysis, Sanford C. Bernstein & Co., Inc., New York, 1982.



Smaller coin-operated video game manufacturers purchase printed circuit boards from the larger producers or other sources and then stuff the boards with integrated circuits they have programed.

U.S. producers of coin-operated video games that have licensed copyrighted games from developers in Japan can import either the complete logic board, just the EPROM's programed with the game, or only the master PROM.

Most monitors are purchased from domestic suppliers; however, these suppliers often furnish monitors either imported from Japan or assembled in the United States from components made in Japan. Some monitors are imported directly from Canada.

Some coin-operated video game manufacturers produce the wood cabinets themselves, and others contract the cabinet and silk screen work out. The assembly of the wire cables connecting the monitor, game logic board, and control panel inside the cabinet is a highly labor-intensive process.

Most laser discs for the arcade video game industry are pressed either in the United States by a limited number of contractors or in Japan. All laser disc players must be imported from either the Netherlands or Japan. Laser discs have video games encoded onto an optically reflective disc. The disc player uses a laser--an intense, monochromatically pure beam of light--to receive the encoded data and transmit them through an EPROM board to be displayed by a monitor.

#### Video game systems and cartridges

The process for producing video game systems begins with the injection molding of the plastic housing for the game console, controllers, and other peripherals. Integrated electronic components, wire cables, and a plastic housing are then assembled into a complete unit. The assembly of components for a computer keyboard for home computers or video game systems with computer capability tends to be more labor intensive than the assembly of other video game/home computer components. Video game cartridges consist of a game logic board enclosed by a plastic housing. Home video games are usually programed onto a single EPROM, making the game logic board for a game cartridge much less sophisticated, smaller in size, and less expensive to manufacture than a logic board for an arcade game.

#### Hand-held video games

Hand-held video games consist of integrated circuits, logic boards, wiring, and LCD or LED screens which are assembled into a compact plastic box which contains an integral control panel.

#### U.S. Tariff Treatment

The principal classification for imported video games and parts thereof in the Tariff Schedules of the United States (TSUS) is item 734.20, which covers game machines and parts thereof. Table 1 shows the current rates of duty which apply to imports of video games and parts thereof.

The rates of duty in column 1 are most-favored-nation (MFN) rates and are applicable to imported products from all countries except those Communist countries and areas enumerated in general headnote 3(f) of the Tariff Schedules of the United States (TSUS). <sup>1/</sup> However, such rates do not apply to products of developing countries which are granted preferential tariff treatment under the Generalized System of Preferences (GSP) or the Caribbean Basin Initiative (CBI).

The rates of duty in column 2 apply to imported products from those Communist countries and areas enumerated in general headnote 3(f) of the TSUSA.

The GSP is a program of nonreciprocal tariff preferences granted by the United States to developing countries to aid their economic development by encouraging greater diversification and expansion of their production and exports. The GSP, implemented by Executive Order No. 11888 of November 24, 1975, applies to merchandise imported on or after January 1, 1976, and is scheduled to remain in effect until January 4, 1985. It provides for duty-free treatment of eligible articles imported directly from designated beneficiary developing countries.

The CBI is a program of nonreciprocal tariff preferences granted by the United States to developing countries in the Caribbean Basin area to aid their economic development by encouraging greater diversification and expansion of their production and exports. The CBI, implemented by Presidential Proclamation 5133 of November 30, 1983, applies to merchandise entered, or withdrawn from warehouse for consumption, on or after January 1, 1984, and is scheduled to remain in effect until September 30, 1995. It provides for duty-free entry of eligible articles imported directly from designated developing countries in the Caribbean Basin area. All of the articles subject to this investigation could be eligible for such duty-free entry.

The U.S. Customs Service has determined that the power supplies, integrated circuits, and cables used in video games, as well as certain types of game controllers, have applications other than with video games. Therefore, these items are classified in general use categories. Game logic boards for arcade games and cartridges used in video game systems are classified as parts of video games (item 734.20). However, game software (cartridges, cassettes, and discs) designed for use with computers and logic boards for computer games are classified as games, not specially provided for, in item 735.20. Monitors imported separately for use with coin-operated video games or home computers are classified as television apparatus. Separately imported game consoles for use with video game systems that have computer capabilities are classified as parts of computers.

<sup>1/</sup> The only Communist countries currently eligible for MFN treatment are the People's Republic of China, Hungary, Romania, and Yugoslavia.

Table 1.--Video games and parts thereof: U.S. rates of duty, present and negotiated, by TSUS items

(Percent ad valorem)				
TSUS item No. 1/	Description	Present : col. 1 rate : of duty 2/	Negotiated : col. 1 rate : of duty 3/	Col. 2 rate of duty 4/
734.20 (pt.)A*	Video games and parts thereof.	4.5%	3.9%	35%.
735.20 (pt.)A*	Game cartridges, cassettes, discs, and parts thereof designed for use with computers.	5.92%	4.64%	40%.
676.15 (pt.)A	Home computers-----	4.5%	3.9%	35%.
682.60 (pt.)A*	Power supplies-----	4.7%	3%	35%.
685.90 (pt.)A*	Joy sticks, X-Y controllers, keyboard controllers, and antenna switch boxes.	6.5%	5.3%	35%.
687.74 (pt.)	Monolithic integrated circuits not assembled to a printed circuit board.	4.2%		35%.
688.15 (pt.)A*	Cables used to connect consoles with monitors.	5.8%	5.3%	35%.

1/ The designation "A" or "A\*" indicates that the item is currently designated as an eligible article for duty-free treatment under the U.S. Generalized System of Preferences (GSP). "A" indicates that all beneficiary developing countries are eligible for the GSP. "A\*" indicates that certain of these countries, specified in general headnote 3(c) of the Tariff Schedules of the United States, are not eligible.

2/ Effective Jan. 1, 1984.

3/ Rate negotiated in the Tokyo round of the Multilateral Trade Negotiations in Geneva, to be achieved through 8 annual reductions, with the final reduction to be effective Jan. 1, 1987. This is also the preferential rate of duty reflected in the "LDDC" column of the TSUS which applies to products of the least developed developing countries, enumerated in general headnote 3(d) of the TSUS.

4/ Statutory rate.

The U.S. International Trade Commission has received two complaints which alleged violations of section 337 of the Tariff Act of 1930 with regard to video games. On June 9, 1981, in investigation No. 337-TA-87, Certain Coin-Operated Audio-Visual Games and Components Thereof, the Commission determined that a violation existed in the importation and sale of certain coin-operated audiovisual games, kits, and components which infringed on the copyrighted audiovisual work of a U.S. manufacturer, infringed that company's common law trademark and bore false designation of origin. On June 25, 1981, the Commission ordered that such products be excluded from entry into the United States.

The domestic producer filed another complaint with the Commission on April 17, 1981, alleging that it was being injured by the importation and sale of certain coin-operated audiovisual games which infringed on its copyrights in the audiovisual works of two more of its games and which also infringed on its common law trademark rights. On June 22, 1982, in investigation No. 337-TA-105, Certain Coin-Operated Audio Visual Games and Components Thereof, the Commission determined that there was a violation of section 337 with regard to one of the games as alleged, but there was no violation with regard to the other game, because production of that game had ceased and there was no longer a U.S. industry to be injured by infringing imports. On July 1, 1982, the Commission ordered that coin-operated game machines which infringed the first game's copyright and trademarks be excluded from entry into the United States. The Customs Court of Patent Appeals later ruled that there was a violation of section 337 with regard to the second game and remanded the case back to the Commission in November 1983 for a determination of the proper remedy.

Former employees of two firms filed for adjustment assistance with the Department of Labor in July 1983, contending that competition from imported video games had caused their unemployment. One of the firms manufactured printed circuit boards for coin-operated video games, and the other company made video game systems. An estimated total of 250 to 400 employees working on video games were laid off from the two firms in January-June 1983.

#### PROFILE OF THE U.S. INDUSTRY

##### Producers

##### Coin-operated video games

Twenty firms manufactured coin-operated video games in the United States by the end of 1983, compared with four such firms in 1978. Seven of these firms are subsidiaries of Japanese producers. The bulk of production in 1983 occurred in the Chicago area and in California near San Jose and Los Angeles. The two largest companies together accounted for over one-half of production in 1983. However, the market share of specific firms varies greatly from one year to the next, depending on which companies have introduced hit games that year. A principal arcade game manufacturer is also the largest supplier of video game systems and game software and one of the five major suppliers of home computers to the U.S. market.

The first recorded development of a video game was by a graduate student at the Massachusetts Institute of Technology in 1962. 1/ A decade later, a graduate student at the University of Utah developed another video game and started marketing a coin-operated version of it in 1973. The game was designed to be easy to learn in order to appeal to players who might be discouraged by complex instructions. By 1974, approximately 100,000 coin-operated versions of this game had been produced, but only about

1/ Computer Buyer's Guide and Handbook, Computer Information Publishing, Inc., Chappaqua, N.Y., 1982.



10 percent had been manufactured by the originator's company. <sup>1/</sup> The success of the initial coin-operated video game encouraged a number of pinball and juke box manufacturers to enter the coin-operated video game market. A U.S. subsidiary of a Japanese firm manufacturing arcade games in both Japan and the United States introduced the first microprocessor-based, coin-operated video game in 1975 and the first game which increased the level of difficulty in phases in 1979. Both of these developments were major influences in increasing the appeal of arcade video games.

The largest domestic producer of coin-operated video games is largely vertically integrated, manufacturing printed circuit boards and receiving die-cast metal parts, injection-molded plastic parts, cable, cabinetry, and silk screening from sister subsidiaries of its parent company. The basic purchased components from outside the corporate family are integrated circuits and monitors. Its state-of-the-art facilities for producing printed circuit boards and assembling logic boards, combined with economies of scale, vertical integration, and the size of the parent company's distribution network, give it a strong competitive position. <sup>2/</sup>

Other manufacturers vary in their degree of vertical integration. However, all of the companies purchase integrated circuits and monitors. Some manufacture printed circuit boards and cabinets, sometimes for other companies as well as themselves; most purchase control panels and contract out silk screening. The basic production functions in common for most of the companies are programing the integrated circuits with video games, inserting integrated circuits and other components onto printed circuit boards to form game logic boards, and assembling the components and electronic cables into the final product.

A large portion of the integrated circuits and monitors used in coin-operated video games are imported by domestic suppliers that sell both U.S.-made and imported components to the arcade game manufacturers. However, some of the producers in the Chicago area import monitors directly from Canada.

To varying degrees, almost all of the manufacturers conduct research and development to create games which they can market. Most rely on a combination of games developed in-house and copyrighted games licensed from Japanese companies. At least one company markets only games which it develops in-house. A few companies specialize as talent scouts to search out game ideas from authors outside the firm which they believe will be hits. When a copyrighted game is licensed from a foreign source (usually Japan), the domestic producer may import either the game logic boards, the EPROM's, or the master PROM from the copyright holder. Successful copyrighted games developed by coin-operated video game producers are frequently licensed to video game system manufacturers, hand-held video game producers, independent game cartridge producers, computer manufacturers, and computer software publishers.

<sup>1/</sup> The audio-visual work was not copyrighted.

<sup>2/</sup> "Williams Electronics May Sell Certain Assets of Games Unit to Bally," The Wall Street Journal, Nov. 30, 1983, p. 4.

Most of the U.S. subsidiaries of Japanese producers import game logic boards from their parent companies and assemble the logic boards with other components purchased in the United States to produce complete games. However, several of these companies and a few U.S. firms package the game logic boards, along with new control panels and decals for the cabinetry, as conversion kits. By replacing the logic board of a game that has lost its player appeal with a new logic board, and changing the artwork on the cabinet, an operator can convert an old game into a new game without losing his investment in the cabinet and monitor. The typical price for a conversion kit is \$400 to \$700 compared with complete games (in their cabinets) at \$2,200 to \$2,800. (Laser disc video games cost arcade video game operators between \$4,000 and \$5,000 each). U.S. producers began making conversion kits available to operators in early 1982.

#### Video game systems

Five U.S. producers dropped out of the home video game business during 1978-83. Of the four that remained, three also produce hand-held video games, and three make home computers. <sup>1/</sup> A large proportion of the industry makes extensive use of overseas production facilities. To varying degrees, each offshore manufacturer incorporates some U.S.-made components, such as programed integrated circuits, into their systems and also performs some manufacturing, assembly, and/or packaging operations in the United States.

The bulk of the software sold for use with home computers is programed with video games. <sup>2/</sup> In effect, home computers have been used chiefly as elaborate video game systems. Home computers differ from personal computers in that the latter find their primary use in business applications, even if located in the home. Most home computers had a base retail price less than \$800 during 1978-83 and they possess less memory capacity than personal computers. <sup>3/</sup>

The chief areas for the production, assembly, and packaging of video game systems and home computers are located near San Jose and Los Angeles, Calif., Dallas, Tex., Albany, N.Y., and Hartford, Conn.

The first video game system was introduced in 1972 by a foreign-based firm manufacturing a variety of electronic products in the United States. A U.S. firm followed with a home version of its arcade game in 1975. Both of these systems were dedicated (hard-wired) video games. However, because of reduced interest in dedicated games, programmable video game systems were

<sup>1/</sup> The five largest U.S. producers of home computers accounted for 84 percent of worldwide shipments in 1983. Mark Halper, "Embattled Home CPU Suppliers Face High-End Challenge," Electronic News, Jan. 2, 1984, p. 50.

<sup>2/</sup> Andrew Pollock, "The Coming Crisis in the Home Computer Industry," The New York Times, June 19, 1983, p. 1.

<sup>3/</sup> David E. Sanger, "The Giant and It's New Peanut," The New York Times, Aug. 19, 1983, p. D1.

introduced in 1977. <sup>1/</sup> By the end of that year, other companies introduced programmable video games. A large inventory of programmables built up by 1978, precipitating the departure of some firms from the market; another left in 1980 to concentrate on the arcade business. By mid-1981, most video game system components were produced or assembled in Hong Kong and Taiwan. Although the largest producer of video game systems brought some of its production to the United States early in 1982, most was returned to Hong Kong and Taiwan later that year in order to cut costs in the face of stiff price competition. <sup>2/</sup>

All of the video game system manufacturers produce software compatible with the hardware they produce. The appeal of the games offered by these system producers is very important in the competition between them. One company specializes in obtaining licenses to produce popular arcade games, another specializes in space games developed in-house, and a third specializes in the quality of the graphics for its sports games. The initial response to the intercompany competition was to obtain the rights to games projected to have player appeal or to games similar in format to games with proven player appeal. The second response was to introduce a second generation of hardware which had greater memory power, enabling the manufacturer to promote the improved graphics, sound, and game action of its systems and companion software while reducing the price of the first generation systems. <sup>3/</sup> The third response, beginning in 1982 and escalating in 1983, was to market adapters which would allow software designed for another producers' hardware to be played on the company's system.

With access to software and the quality of graphics decreasing in importance, video game system producers sought to differentiate their products in 1983 by adding expansion units which would turn the systems into home computers. <sup>4/</sup> They were also pressured to add computer capability in 1983 because home computer manufacturers, recognizing that the chief use of their products was to play games, began promoting home computers as both game players and as aids for educational and other interests. With a large number of companies offering products which could perform similar functions, the

<sup>1/</sup> Peter D. Petre, "Atari and the Video Game Explosion," Fortune, July 27, 1981, p. 40ff.

<sup>2/</sup> Martha M. Hamilton, "Fragile Frontier: Atari's Departure Illustrates Flows in High-Tech Job Situation," The Washington Post, Feb. 27, 1983, p. F4.

<sup>3/</sup> Mark Sullivan, "Varied Marketing Strategies Key Growth of Electronics," Playthings, April 1980, p. 48ff.

<sup>4/</sup> Laura Landro, "Living Room War: Video Game Firms Take On Computer Invaders; Atari to Unveil Keyboard for its Machines Today," The Wall Street Journal, February 29, 1983, p. 54; and "Video Games Enter Computer Age," Chain Store Age, General Merchandise Edition, October 1979, p. 79.

ultimate weapon in gaining a larger share of the market for video game systems/home computers was through price reductions. <sup>1/</sup>

#### Game software

Video game system suppliers accounted for over one-half of the U.S. production of video game software in 1982. Some of the other home computer producers also made game software. In addition, over 100 independent software producers offered game programs for use on the variety of game systems and computer hardware in 1982 and 1983. <sup>2/</sup> Several of the largest game cartridge producers assembled game logic boards in low-wage-rate countries using EPROM's programed in the United States. However, most of these firms performed the final assembly, combining the logic board and plastic housing, in the United States. The chief manufacturing locations for game software are California, Texas, New York, and Puerto Rico. Much of the overseas subassembly work is done in Singapore.

#### Hand-held video games

The world's largest producer of hand-held video games is a U.S. company which manufactures its games in Hong Kong. It introduced hand-held video games to the U.S. market in 1978. It was followed by three firms which produce the games in Connecticut and Massachusetts from a combination of domestically produced and imported components and another U.S. company which makes its games in Hong Kong.

#### Production, Capacity, and Capacity Utilization

#### Coin-operated video games

U.S. production of coin-operated video games rose sharply during 1978-82, more than doubling in 1981 alone. As shown in table 2, production peaked in 1982, and, reflecting the reduced market, production in January-June 1983 fell by 56 percent compared with that in January-June 1982.

With the entry of several new firms during 1980-82 and the expansion of existing operations, capacity to produce coin-operated video games more than doubled between 1980 and 1982. Reacting to production beyond practical capacity levels in 1981, producers increased capacity by 39 percent in 1982 (table 2). However, production rose by only 6 percent in 1982, bringing capacity utilization down to 80 percent that year. As the market for arcade video games contracted in 1983, capacity utilization dropped to 34 percent in January-June.

<sup>1/</sup> Michael Rogers, "Trouble in Computer Land," Newsweek, Sept. 26, 1983, p. 72.

<sup>2/</sup> Laura Landro, "Atari Fiercely Tries to Protect Its Share of Video Game Sales," The Wall Street Journal, June 10, 1982, p. 33; and Andrew C. Brown, "Cashing in on the Cartridge Trade," Fortune, Nov. 15, 1982, p. 125f.



Table 2.--Coin-operated video games: U.S. production, production capacity, capacity utilization, 1980-82, January-June 1982, and January-June 1983 <sup>1/</sup>

Item	1980	1981	1982	January-June--	
				1982	1983
Production-----1,000 units--	175	359	379	223	97
Production capacity					
1,000 units--	207	341	476	275	287
Capacity utilization					
percent--	85	105	80	81	34

<sup>1/</sup> Data for 1978 and 1979 were withheld to avoid disclosing operations of individual companies.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

#### Video games systems

U.S. production of video game systems in 1979 was roughly one-third the 1978 level, reflecting decreased interest in dedicated games and an inventory overhang from a poorer-than-expected Christmas selling season in 1978. <sup>1/</sup> However, with the conversion to programmable video game systems, production surpassed the 1978 level in 1981 and more than doubled in 1982. Production in January-June 1983 was below that of January-June 1982, because a major producer began transferring the remainder of its production to the Far East.

Despite the sharp downturn in production in 1979, capacity utilization actually increased, because several companies dropped out of the dedicated video game system business. During 1979-82, production capacity more than quadrupled.

The production of home computers began in 1979, but did not become significant until 1982. In January-June 1983, the production of home computers nearly equaled that of video game systems.

#### Game software

The production of game software, chiefly video game cartridges, increased more than fifteenfold during 1978-82, peaking at 104.8 million units in 1982. However, an overly optimistic view of the market resulted in large inventories of cartridges after the record-setting, yet disappointing, Christmas selling season of 1982. Consequently, production was 27 percent lower in January-June 1983 than that during January-June 1982 (34 million units compared with 47 million).

<sup>1/</sup> Precise data have been withheld to avoid disclosing operations of individual companies.

Most software publishers, including those manufacturing video game system hardware, use contractors for both the subassembly of the game logic boards and the final assembly of the logic boards with the plastic housing. Since the questionnaire respondents did not report the production capacity of their contractors, it was not possible to calculate the capacity utilization for video game cartridges.

#### Hand-held video games

Although no hand-held video games were produced in the United States in 1978, several domestic toy and game producers entered the market in 1979. Production reached 2.6 million units in 1979 but declined to 2.1 million the following year. During 1981 and 1982, however, most of these producers went on to start manufacturing video game systems, home computers, and/or game software as demand shifted to those products. Accordingly, production of hand-held video games was reduced, particularly in January-June 1983.

#### Producers' Shipments and Exports

U.S. producers' shipments of all video games increased from \$218.1 million to \$3.1 billion during 1979-82, but fell by one-quarter in January-June 1983 compared with those in January-June 1982 (table 3, fig. 1). <sup>1/</sup> U.S. exports of complete games, on the other hand, rose more than sixfold during 1978-82 and continued to rise during January-June 1983, by 65 percent. Increased exports of game software (up by \$40.7 million) more than offset falling exports of coin-operated game machines during 1981 and 1982 (down by \$24.3 million). U.S. exports of components for video games peaked in 1980 at \$10.9 million, consisting chiefly of game logic boards. However, strong growth was exhibited in January-June 1983, led by game controllers and disc drives.

<sup>1/</sup> Data describing the production of video games in 1978 have been withheld to avoid disclosing operations of individual companies. Production increased significantly in 1979 from 1978.

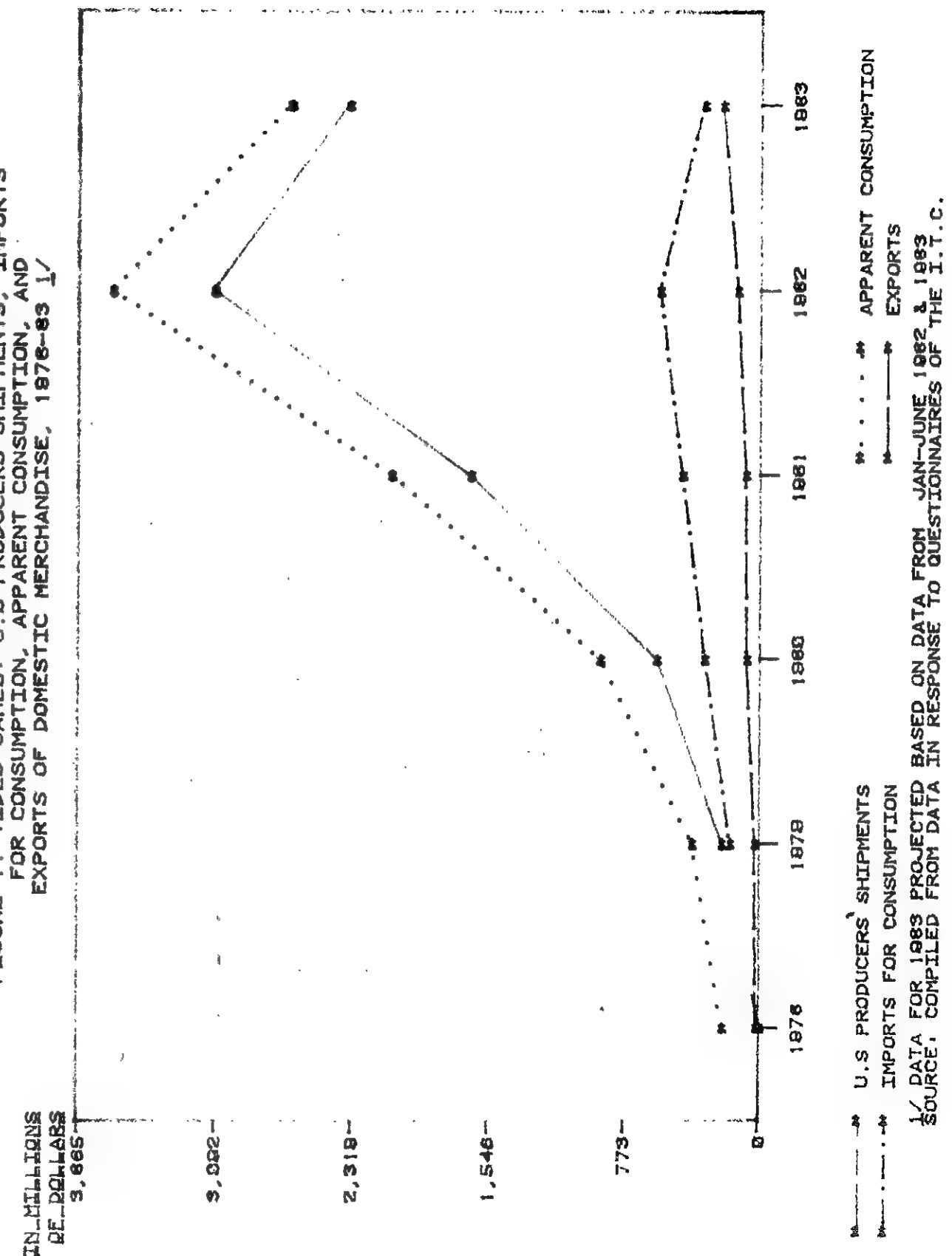
Table 3.--Video games and components: Shipments of domestically produced complete video games and components in the U.S. market and U.S. exports of domestic merchandise, 1978-82, January-June 1982, and January-June 1983

Item	1978	1979	1980	1981	1982	January-June--	
						1982	1983
Complete games:							
Shipments of domestically produced video games in the U.S. market (million dollars)--	1/	218.1	591.3	1,653.9	3,101.9	1,450.1	1,094.5
U.S. exports of domestic merchandise (million dollars)--	18.7	29.4	76.6	84.4	132.6	37.8	62.5
Components for video games:							
Shipments of domestically produced components in the U.S. market (million dollars)--	1/	7.6	18.0	41.2	137.3	55.6	63.7
U.S. exports of domestic merchandise (million dollars)--	3.9	6.2	10.9	4.8	5.0	1.3	4.2

1/ Certain data are not provided to avoid revealing the operations of individual companies.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

FIGURE 1. VIDEO GAMES: U.S. PRODUCERS SHIPMENTS, IMPORTS FOR CONSUMPTION, APPARENT CONSUMPTION, AND EXPORTS OF DOMESTIC MERCHANDISE, 1978-83 1/





Game logic board components and disc drives accounted for over one-half of the value of U.S.-made video game components shipped separately to the U.S. market in 1982.

The principal markets for U.S. exports of video games have been Canada, West Germany, Italy, and the United Kingdom (fig. 2). Combined, these four accounted for 60 percent of U.S. exports of video games and components in 1982 (table 4). <sup>1/</sup>

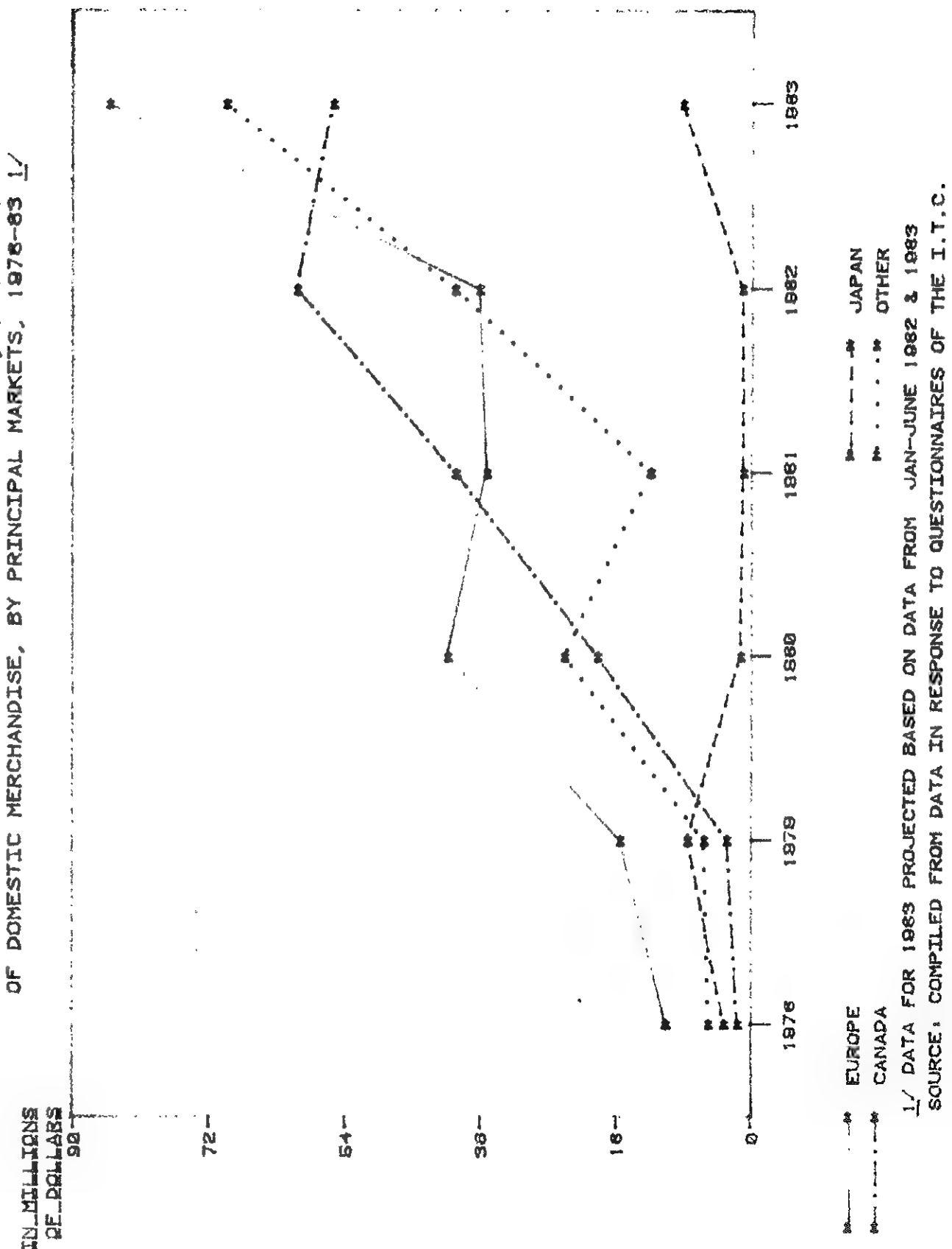
Table 4.--Video games and components: U.S. exports of domestic merchandise, by principal markets, 1978-82, January-June 1982, and January-June 1983

Market	(In thousands of dollars)					January-June--	
	1978	1979	1980	1981	1982	1982	1983
Western Hemisphere:							
Canada-----	1,859	3,271	20,629	39,443	60,512	30,439	28,010
Mexico-----	5	41	72	204	60	30	80
Other-----	5,115	5,634	8,997	5,928	8,373	2,639	2,172
Europe:							
United Kingdom-----	822	4,962	5,077	11,392	1,728	906	634
West Germany-----	829	2,100	10,058	10,197	11,860	67	8,033
France-----	2,090	3,265	7,028	6,167	5,766	359	2,397
Italy-----	1,243	2,086	2,215	1,561	7,965	2,425	8,017
Other-----	6,503	5,008	15,981	5,942	8,943	645	7,084
Australia-----	370	676	8,167	3,497	5,615	587	2,045
Far East:							
Japan-----	3,730	8,486	1,453	1,098	1,306	117	2,812
Hong Kong-----	-	-	179	1,695	12,579	162	2,742
Singapore-----	-	-	39	29	314	76	168
Other-----	82	30	50	89	320	25	34
All other-----	16	55	7,567	1,966	12,304	587	3,106
Total-----	22,664	35,614	87,512	89,208	137,645	39,064	67,334

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

<sup>1/</sup> App. B lists the barriers to international trade cited by U.S. exporters of video games and components in response to questionnaires of the U.S. International Trade Commission.

FIGURE 2. VIDEO GAMES AND COMPONENTS: U.S. EXPORTS OF DOMESTIC MERCHANDISE, BY PRINCIPAL MARKETS, 1978-83 <sup>1/</sup>



### Coin-operated video games

The growth in producers' domestic shipments of coin-operated video games slowed in 1982 after more than doubling in 1981 (table 5). Shipments to the domestic market dropped to 82,000 units or by 60 percent, in January-June 1983, reflecting the deteriorating arcade market.

Table 5.--Coin-operated video games: Shipments of domestically produced video games in the U.S. market and U.S. exports of domestic merchandise, 1978-82, January-June 1982, and January-June 1983

Period	Domestic shipments			U.S. exports		
	Quantity	Value	Unit value	Quantity	Value	Unit value
	<u>1,000</u> <u>units</u>	<u>1,000</u> <u>dollars</u>		<u>1,000</u> <u>units</u>	<u>1,000</u> <u>dollars</u>	
1978-----	24	39,828	\$1,632	1/	1/	1/
1979-----	1/	1/	1/	1/	1/	1/
1980-----	150	255,731	1,709	28	52,312	\$1,849
1981-----	342	643,137	1,881	30	52,864	1,793
1982-----	355	716,006	2,016	15	28,635	1,884
January-June--						
1982-----	208	429,642	2,061	8	14,842	1,876
1983-----	82	164,296	2,003	3	5,045	1,545

1/ Certain data have not been published to prevent the release of information which might reveal the operations of individual companies.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

The difficulties experienced by arcade video game producers in the U.S. market occurred 1 year earlier in Europe. The decline in the market for video games in Europe was exacerbated by reduced player interest caused by large numbers of low quality games from Taiwan. The growth in exports to all markets slowed in 1981, and then fell by 48 percent in 1982. The sharp slide continued through January-June 1983, dropping by 58 percent from January-June 1982.

Table 6 reflects the fact that proximity to the Canadian market allowed U.S. producers to be competitive there until the collapse of the market in 1983, whereas in Europe, U.S. exporters lost market share to less expensive imports from Taiwan beginning in 1981. The drop in average unit value of U.S. exports to Europe to \$509 in 1983 from \$1,224 in 1982 indicates that U.S. producers were trying to regain a larger share of the European market by exporting conversion kits.

Table 6.--Coin-operated video games: U.S. exports of domestic merchandise, by principal markets, 1980-82, January-June 1982, and January-June 1983

(Quantity in units; value in thousands of dollars)						
Market	1980	1981	1982	January-June--		
				1982	1983	
Quantity						
Europe-----	16,889	15,881	1,479	890	700	
Western Hemisphere-----	10,486	12,079	13,131	6,926	2,462	
All other-----	917	1,518	592	95	103	
Total-----	28,292	29,478	15,202	7,911	3,265	
Value						
Europe-----	31,172	26,587	1,883	1,089	356	
Western Hemisphere-----	19,437	23,974	25,632	13,594	4,505	
All other-----	1,703	2,303	1,120	159	184	
Total-----	52,312	52,864	28,635	14,842	5,045	
Unit value						
Europe-----	\$1,846	\$1,674	\$1,273	\$1,224	\$509	
Western Hemisphere-----	1,854	1,985	1,952	1,963	1,830	
All other-----	1,857	1,517	1,892	1,673	1,786	
Average-----	1,849	1,793	1,884	1,876	1,545	

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

### Video game systems

Shipments of U.S.-produced video game systems to the domestic market fell during 1978-80 as consumers grew bored with dedicated video games. Shipments more than doubled in 1981 over those in 1980, however, as programmable systems grew in popularity. Shipments more than doubled again in 1982, but declined slightly in January-June 1983. The growth in shipments of home computers offset this decrease seven times over. The average unit value of video game shipments was halved between 1981 and 1983, and the average unit value of home computers in 1983 was barely over one-half of what it was in 1982.

The value of exports of home video game systems reached \$31 million in 1982, surpassing the value of arcade video game exports for the first time. The quantity exported in January-June 1983 was nearly double that exported in January-June 1982, but the value declined as the average unit value was reduced sharply. Exports of home computers in January-June 1983 were ahead of those in all of 1982 in terms of quantity and value.

Canada was the dominant export market for home video game systems throughout 1978-83. On the other hand, Italy rivaled Canada as the chief market for home computers in 1982 and January-June 1983.



### Game software

U.S. producers' shipments of domestically made game software to the U.S. market rose sharply during 1978-81 and more than doubled between 1981 and 1982, reaching 76 million units, valued at \$1.2 billion, in 1982. A glut of inventory following a less-than-expected Christmas selling season in 1982 resulted in a 7-percent decline in the quantity of software shipped in January-June 1983 compared with that in January-June 1982. <sup>1/</sup>

U.S. exports of video game software were unaffected by this local condition, however, falling just 20 percent shy of full-year 1982 exports in January-June 1983 (table 7). Exports in 1982 were approximately triple those exported in 1981 (in both quantity and value). Canada was the largest single-country market in 1980 and 1981 but was overshadowed by West Germany, Hong Kong, and Australia in 1982.

Table 7.--Game software: U.S. exports of domestic merchandise, by principal markets, 1980-82, January-June 1982, and January-June 1983

(Quantity in thousands of units; value in thousands of dollars)					
Market	1980	1981	1982	January-June--	
				1982	1983
Quantity					
Canada-----	1,339	580	308	127	391
Europe-----	44	652	1,762	100	1,546
All other-----	1,467	214	2,183	47	1,463
Total-----	2,850	1,446	4,253	274	3,400
Value					
Canada-----	2,914	12,951	3,228	1,600	5,789
Europe-----	667	5,938	30,123	1,710	18,690
All other-----	5,644	4,191	30,404	1,127	9,661
Total-----	9,225	23,080	63,755	4,437	34,140
Unit value					
Canada-----	\$2.18	\$22.32	\$10.47	\$12.57	\$14.82
Europe-----	15.02	9.11	17.10	17.10	12.09
All other-----	3.85	19.58	13.93	23.98	6.60
Average-----	3.24	15.96	14.99	16.19	9.84

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

<sup>1/</sup> Sam Smutherland, "Meet Scrutizes Videogame Shifts," Billboard, Apr. 23, 1983, p. 55.

### Hand-held video games

U.S. producers' shipments of domestically made hand-held video games in the U.S. market reached a peak in 1982 after slumping in 1981. The number of units shipped in 1982 was slightly higher than that in 1980. However, in January-June 1983, shipments were less than one-half the volume recorded during January-June 1982.

With the deterioration of the U.S. market in 1983 because of competition from video game systems/home computers, producers of hand-held video games interviewed during this investigation stated that they are placing more emphasis on foreign markets. In this connection, the ratio of exports to production rose from approximately 2 percent in 1982 to 18 percent in January-June 1983. Canada has been the leading market for U.S. exports of hand-held video games.

### Inventories

#### Coin-operated video games

Inventories did not become a problem for arcade video game manufacturers until 1983. Growing demand helped keep the ratio of inventories to production below 2.3 percent annually during 1980-82 (table 8). However, as the market contracted in 1983, this ratio rose to 21.1 percent. This rate is especially high for an industry with many manufacturers which produce only to fill orders and maintain a working inventory.

Table 8.--Coin-operated video games: U.S. producers' inventories as of Dec. 31 of 1980-82, June 30, 1982, and June 30, 1983

Indicator	1980	1981	1982	January-June--		
				1982	1983	
Inventories as of						
Dec. 31 or June 30						
1,000 units--	1.9	<sup>1/</sup>	8.8	7.1	20.5	
Ratio of inventories to						
production--percent--	1.0	<sup>2/</sup>	2.3	3.2	21.1	

<sup>1/</sup> Less than 50 units.

<sup>2/</sup> Less than 0.05 percent.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

### Video game systems

Inventories of dedicated video game systems were relatively high at the end of 1978 and were a factor in at least two companies departing from the industry in that year. However, since 1978 and the conversion of the market to programmable video game systems, inventories have not exceeded 5 percent of production.

Despite the rapid growth in producers' shipments and exports of home computers, production has grown at an even faster rate. Consequently, inventories were relatively high on June 30, 1983. High inventories were cited as one of the reasons why one of the largest home computer manufacturers exited from the low end of the computer market in late 1983.

### Game software and hand-held video games

As with home computers, production of game software outstripped even record domestic shipment and export levels. Nearly one-third of the year's production was in inventory on December 31, 1982, following a less-than-spectacular Christmas season. Producers' inventories of hand-held video games were consistently high during 1979-83, ranging between one-quarter and one-half of production.

### Employment

Employment of production and related workers in the domestic video game industry quadrupled during 1978-83, from 2,249 to 9,225 (table 9, fig. 3). Employment continued to rise in January-June 1983 compared with that in January-June 1982, by 13 percent, from 8,176 to 9,225. Although the largest producer of video game systems initiated layoffs during January-June 1983 preparatory to closing its U.S. production facilities in favor of overseas production, expansion of the workforce involved in manufacturing home computers and game software more than offset this loss in employment.

Man-hours worked by production and related workers reflect the changes in the workforce. Man-hours worked in the production of all types of video games more than quadrupled during 1978-82, from 3.8 million to 11.8 million hours (table 10).

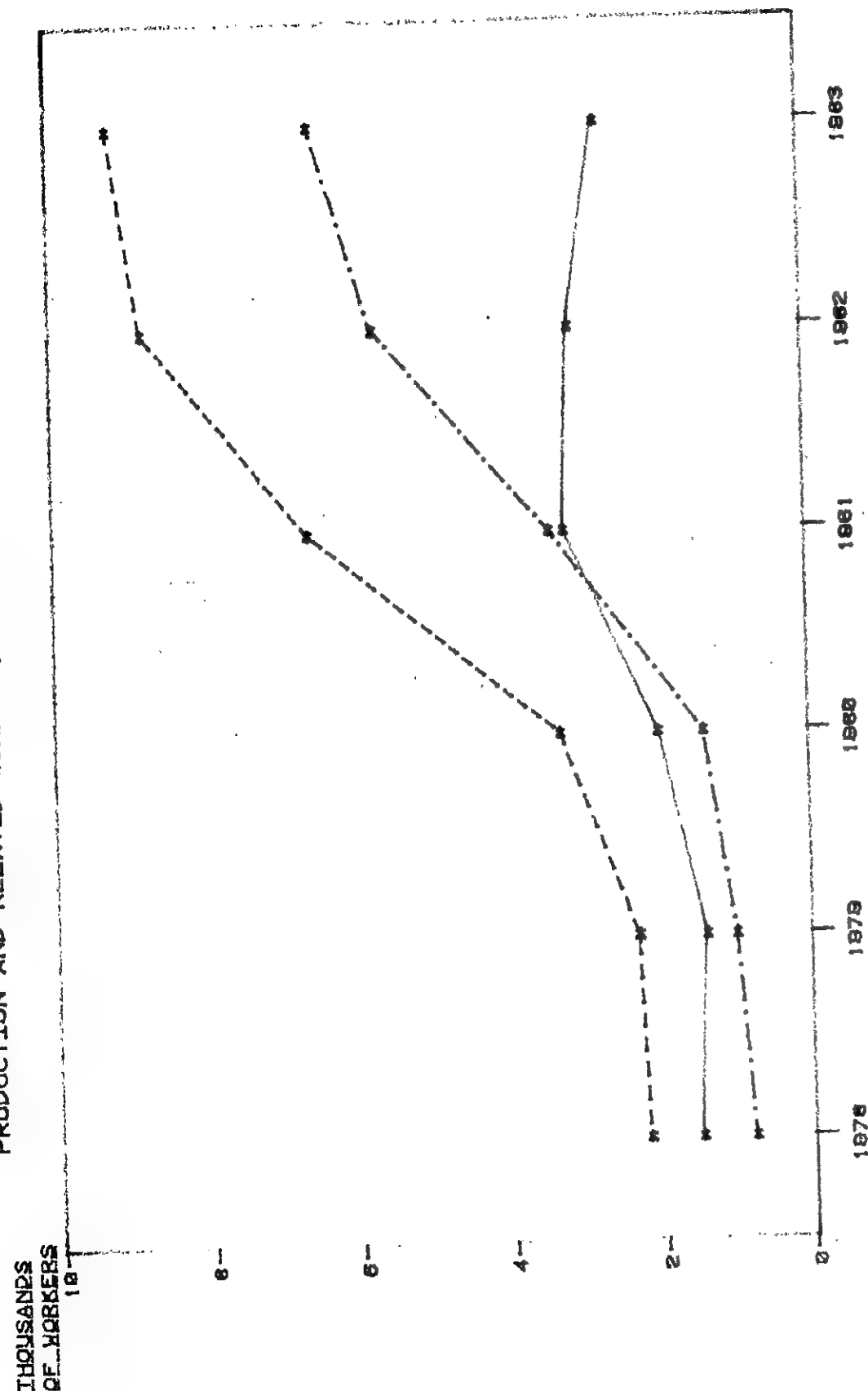
Table 9.—Average number of employees, total and production and related workers employed in establishments producing video games and components, by types, 1978-82, January-June 1982, and January-June 1983

Item	1978	1979	1980	1981	1982	January-June--	
						1982	1983
All persons employed in establishments producing video games and components-----	13,742	15,170	17,213	19,355	23,668	21,605	25,051
Production and related workers:							
All products-----	9,126	9,821	11,264	13,017	13,851	13,315	14,376
Video games and components:							
Coin-operated video games----	1,491	1,361	1,978	3,193	3,070	3,408	2,688
All other-----	758	986	1,352	3,439	5,688	4,768	6,537
Total-----	2,249	2,347	3,330	6,632	8,758	8,176	9,225

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.



FIGURE 3. VIDEO GAMES AND COMPONENTS: AVERAGE NUMBER OF PRODUCTION AND RELATED WORKERS, 1978-82, AND JANUARY-JUNE 1983



--- COIN-OPERATED VIDEO GAMES  
 - - - OTHER VIDEO GAMES AND COMPONENTS  
 \* \* \* ALL VIDEO GAMES & COMPONENTS

SOURCE: COMPILED FROM DATA IN RESPONSE TO QUESTIONNAIRES OF THE I.T.C.

Table 10.--Video games: Man-hours worked by production and related workers, by types, 1978-82, January-June 1982, and January-June 1983

Type	(In thousands of hours)						January-June--	
	1978	1979	1980	1981	1982		1982	1983
Coin-operated video games	2,497	2,339	3,011	4,473	4,614		2,378	2,687
All other	1,270	1,612	1,599	3,425	7,147		3,032	5,477
Total	3,767	3,951	4,610	7,898	11,761		5,410	8,164

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

#### Coin-operated video games

The coin-operated video game industry employed 3,408 at its peak in January-June 1982, more than double the level in 1978 (table 9). Within a year, however, the market had collapsed, and employment of production and related worker was reduced by 21 percent to 2,688 in January-June 1983. Man-hours worked in the production of arcade video games nearly doubled during 1978-82, from 2.5 million to 4.6 million hours. Man-hours worked actually rose in January-June 1983 over those in January-June 1982, despite a decline in production. As a result, man-hours worked per unit produced climbed from 10.7 to 27.7 (table 11). This reversed the trend which had brought this indicator of productivity down from 56.8 hours in 1978 to 12.5 hours in 1981.

Table 11.--Coin-operated video games: Average number of man-hours worked per unit produced, 1978-82, January-June 1982, and January-June 1983

Item	1978	1979	1980	1981	1982	January-June--	
						1982	1983
Coin-operated video games	56.8	35.4	17.2	12.5	12.2	10.7	27.7

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

#### Video game systems

Employment of production and related workers involved in producing video game systems more than quintupled during 1979-82. However, releases due to a shift in production to overseas facilities cut employment roughly in half during January-June 1983. The expansion of employment in the production of home computers between 1982 and January-June 1983 approximately offset the

impact of this move offshore. Also growing is employment involved in the production of game controllers and disc drives for video game system/home computers.

#### Game software

The number of workers producing game software rose from 57 to 542 during 1980-82, and to 1,305 in January-June 1983. <sup>1/</sup> Theoretically, employment in the software segment of the video game system industry should continue to grow even after the saturation of the market with video game system/home computer hardware, because consumers will continue to buy new games for their installed hardware.

#### Hand-held video games

Reflecting the U.S. market, employment in the production of hand-held video games, which began in 1979, peaked in 1980, and made a resurgence in 1982, but was sharply reduced in 1983.

#### Capital Expenditures

Table 12 shows the capital expenditures for U.S. facilities for production, warehousing, and marketing video games and components. Expenditures grew each year during 1978-82, from \$6 million to \$52.2 million, and climbed in January-June 1983 to an amount which was double that spent in January-June 1982 (fig. 4). The bulk of the expenditures in each year was for machinery, equipment, and fixtures.

#### Research and Development Expenditures

An indication of the commitment of U.S. companies to the continued competitiveness of the domestic industry is the level of expenditures for R. & D. Such expenditures rose in each year during 1978-82, from \$12.2 million to \$97.7 million, and nearly doubled in January-June 1983 compared with those in January-June 1982 (table 13, fig. 4). The only type of video game not to exhibit a trend toward increased investment in R. & D. was hand-held video games.

#### Coin-operated video games

Investment in research and development for the arcade video game industry rose from \$5.5 million to \$27 million during 1978-82 and climbed by 12 percent in January-June 1983 over that in January-June 1982 (table 13).

<sup>1/</sup> These figures do not include employment by contractors performing assembly of video game cartridges and discs.

Table 12.--Video games and components: Capital expenditures for U.S. facilities used for production, warehousing, and marketing, by types, 1978-82, January-June 1982, and January-June 1983

(In thousands of dollars)							
Capital expenditures	1978	1979	1980	1981	1982	January-June--	
						1982	1983
Land and land im-							
provements-----	1	622	85	6,880	345	345	231
Building or lease-							
hold improvements--	647	3,078	1,990	4,997	11,640	3,965	9,793
Machinery, equip-							
ment, and fix-							
tures-----	5,316	5,479	7,603	33,767	40,230	15,296	33,532
Total-----	5,964	9,179	9,678	45,644	52,215	19,606	43,556

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table 13.--Video games and components: Expenditures for research and development, by types, 1978-82, January-June 1982, and January-June 1983

(In thousands of dollars)							
Type	1978	1979	1980	1981	1982	January-June--	
						1982	1983
Coin-operated video							
games-----	5,543	5,598	8,343	18,129	26,985	12,446	13,968
All other-----	6,324	10,745	18,481	23,726	58,659	24,275	51,204
Total-----	12,230	17,375	29,001	43,547	97,709	43,324	80,536

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

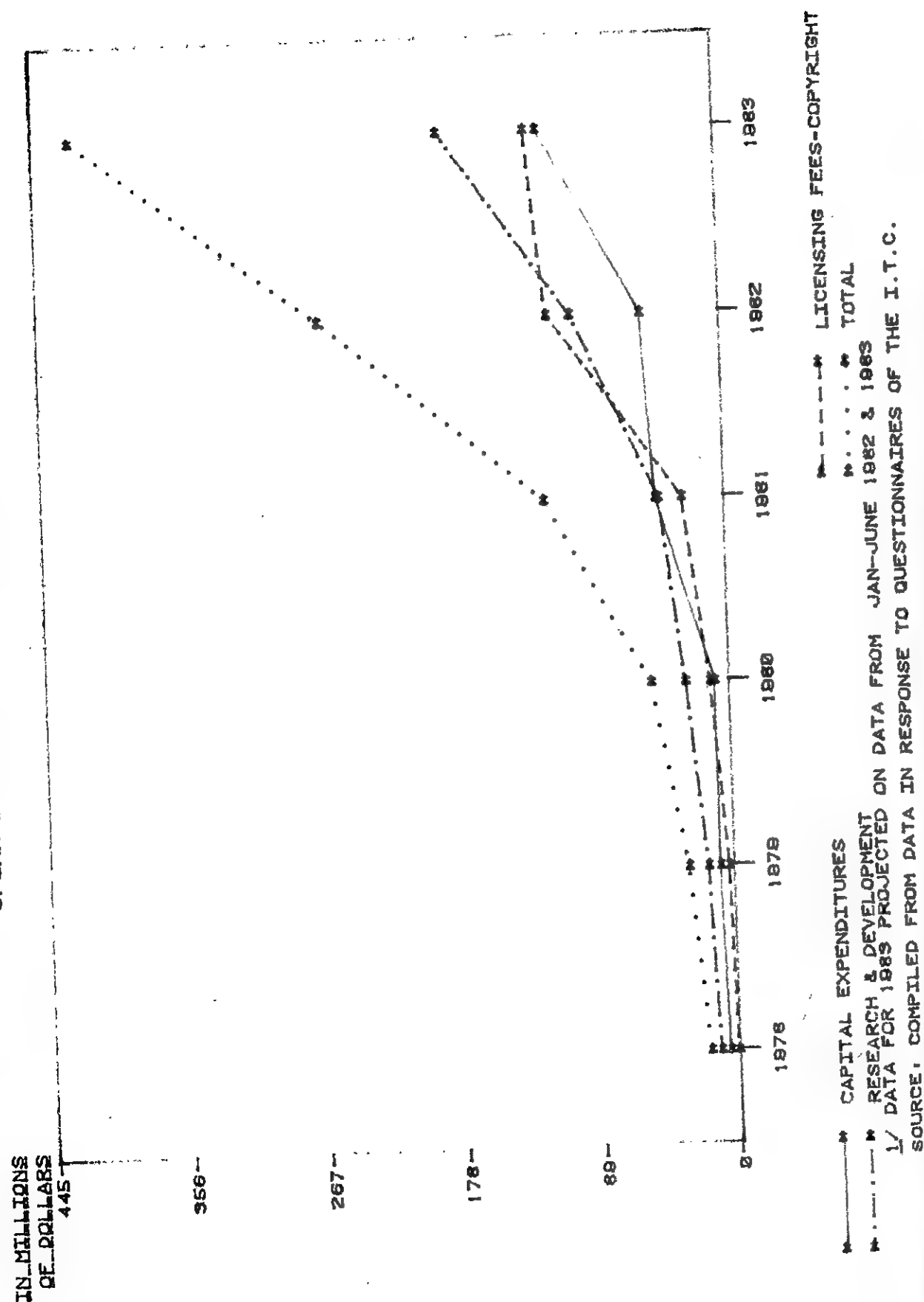
#### Video game systems

Expenditures for R. & D. for home video game systems were flat during 1978-80, but increased sharply in 1982. The increased commitment to research and development was evidenced again in January-June 1983.

More investment was made for research and development in home computers than for any other video game product, including video game systems, in each year during 1979-81 and in 1983.



FIGURE 4. VIDEO GAMES AND COMPONENTS: INVESTMENT IN DOMESTIC OPERATIONS BY U.S. PRODUCERS, 1978-83 1/



### Game software

Expenditures for research and development in game software increased geometrically in each year during 1978-82, except 1981. More was invested in software research and development in January-June 1983 than in the full year 1982. Nearly as much was invested in research and development related to software in 1982 as in video game systems.

### Hand-held video games

Investment during the period in research and development for hand-held video games peaked in 1982, and slowed in January-June 1983. Investment for hand-held video games was generally less than for other types of video games. The producers of hand-held video games are apparently placing more emphasis on other types of games.

### Income and Expenditures From the Licensing of Copyrighted Video Games

Expenditures for licensing copyrighted video games grew annually during 1978-82, from \$0.8 million to \$112.4 million (table 14, fig. 4). These fees are usually paid by arcade video game producers to game developers in Japan, or by game software manufacturers to arcade video game producers (both domestic and Japanese), or to other software producers. The size of the expense is indicative of the pressure to obtain rights to games which are judged to be potential hits.

Receipts were relatively meager until July 1982-June 1983. Royalty payments to Japanese game developers probably accounted for the gap between the royalties paid and received during 1980-82 (table 14).

Table 14.--Income and expense from the licensing of rights to copyrighted video games, 1978-82, January-June 1982, and January-June 1983

Item	(In thousands of dollars)						January-June--	
	1978	1979	1980	1981	1982		1982	1983
Expense-----	783	3,593	12,930	28,460	112,354		44,753	49,549
Income-----	5,369	4,211	3,098	2,661	24,030		3,574	61,759

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

## MAJOR FOREIGN MARKETS AND COMPETITORS

## Japan

Coin-operated video games

Nearly 40 companies entered the Japanese market for coin-operated video games in response to the success of a particularly popular game in 1978. <sup>1/</sup> The market quickly became saturated with illegal copies of copyrighted games, driving down prices and drying up research and development budgets. With few hits to offset waning interest, the Japanese market underwent a severe contraction in early 1982. About 10 companies survived the shakeout. With a plethora of hardware in arcades owned by manufacturers, the remaining producers have concentrated their activities toward the production of conversion kits.

Of the approximately 10 companies which currently manufacture coin-operated video games in Japan, the three largest companies together account for the bulk of production. All of the firms are basically assemblers--purchasing monitors, cables, control panels, integrated circuits, printed circuit boards, and cabinets from other manufacturers. However, most of the coin-operated video game producers operate their own arcades. When specific games lose their popularity in the arcades, the machines are brought back to the manufacturer to be converted into new games.

Japanese manufacturers originally exported arcade games complete with cabinets. However, according to producers interviewed during this study, transportation costs put the Japanese games at a price disadvantage in most foreign markets. As a result, some Japanese producers began licensing copyrighted video games to U.S. producers of coin-operated video games in 1978 in order to share in the wealth of the U.S. market. As the popularity of arcade video games grew in the United States, Japanese copyright holders also licensed their games to U.S. producers of home video game systems, computers, and hand-held games. Several Japanese producers reconsidered this practice, however, and by 1982, they had established subsidiaries in the United States to either assemble Japanese-made game logic boards with U.S.-made cabinets or to market conversion kits. To penetrate the European market, Japanese arcade video game producers usually export game logic boards to Italy, where they are also assembled with locally made cabinets or marketed as conversion kits.

A U.S. producer of laser disc video games reported that although a Japanese company pioneered the application of interactive laser disc technology to the arcade video game industry, the limited production capacity of laser disc player suppliers in Japan has discouraged it from exporting laser disc arcade video games.

U.S. manufacturers of coin-operated video games maintain a competitive, yet interdependent, relationship with producers in Japan. As discussed previously, U.S. producers rely in varying degrees on the research and development in Japan for new games to license. The same high transportation costs which discourage U.S. imports of complete arcade video games from Japan also discourage U.S. exports of coin-operated video games to Japan.

<sup>1/</sup> Jonathan Greenberg, "Japanese Invaders," Forbes, Apr. 13, 1983, p. 98.

Furthermore, the distribution network in Japan is even more tightly controlled by local manufacturers than in the United States. As a result, the only practical way for a U.S. firm to share in the Japanese market is to license copyrighted games to Japanese producers. Although this has been done, only two games marketed in this fashion have become hits with Japanese game players; one was a game developed in France whose copyright was purchased by a U.S. firm and then licensed to a Japanese manufacturer.

One of the most significant developments in the Japanese market in 1983 was the more stringent enforcement of copyright laws. <sup>1/</sup> Reportedly, after a complaint is filed with Government authorities, an official of the company holding the copyright accompanies the authorities to identify infringing game machines. The machines are destroyed and the parties responsible for the infringement arrested.

Video game systems and software

The market for video game systems in Japan began taking off in the spring of 1983 and is not nearly as developed as the U.S. market. Three companies together account for the bulk of Japanese production of video game systems. Personal computer manufacturers in Japan began entering the home video game market in 1983 but have not become an important factor. These hardware producers also manufacture most of the game software marketed in Japan. Although the three largest producers of video game systems have subsidiaries in the United States for the assembly of arcade video games or the licensing of copyrighted video games, none of these firms export video game systems to the United States.

One U.S.-based firm has been successful at marketing its line of video game systems in Japan on an equal footing with the three principal Japanese producers. However, because of language and cultural differences, it is rare for U.S.-made game cartridges to be exported to Japan.

Hand-held video games

The market for hand-held video games in Japan went through a period of boom and bust during 1978-81. Although still strong, the market is expected to lose ground with the ascendancy of video game systems in 1983. Even though several companies produce hand-held video games in Japan, the market is dominated by two firms. Attempts by Japanese companies to market hand-held video games in the United States have been, for the most part, unsuccessful. Two U.S. firms, which manufacture their games in the Orient, have an appreciable share of the market in Japan because of their high quality. Hand-held video games are rarely imported from the United States, because their relatively high prices would not allow them to be competitive.

<sup>1/</sup> "Amusement Equipment Makers Seek Protection of Software," The Japan Economic Journal, Jan. 25, 1983, p. 17.



## Hong Kong

The largest suppliers of video game systems to the U.S. market have significant production facilities in Hong Kong, with one also manufacturing hand-held video games there as well. These firms purchase some electronic components from suppliers in Hong Kong as well as contract out some metal die-casting, plastic injection molding, and assembly operations to local companies. <sup>1/</sup>

In addition to the companies doing subcontract work for U.S.-based firms, several companies make hand-held video games and programmable video game systems. The bulk of the microprocessors and other integrated circuits and capacitors used for video games are imported from the United States. <sup>2/</sup>

Video game systems and software

By mid-1977, seven companies were making dedicated video game systems in Hong Kong, chiefly for consumption in the United Kingdom, France, and West Germany. However, two U.S.-based companies entered into joint ventures with firms in Hong Kong for the production of programmable video game systems in 1980. As these two operations came to dominate the market, most of the other competitors in Hong Kong exited from the video game system business. A remaining company markets a system in Japan. In 1981, 48 percent of Hong Kong's exports of video game systems were marketed in the United States, virtually all the products of the two U.S.-based companies. One of these U.S. producers began assembling its video game cartridges in Hong Kong in 1980. In 1981, it agreed to market a line of home computers developed by a producer in Hong Kong, and in 1983, the other U.S. producer shifted its production of home computers from California to Hong Kong.

Hand-held video games

The first company to produce hand-held video games in Hong Kong began manufacturing the games in 1976. It was soon joined by several competitors. Their principal market was the United States. A U.S.-based company contracted with a manufacturer in Hong Kong for the production of hand-held video games in early 1978. By late 1978, the U.S.-based company had transferred production to one of its own plants in Hong Kong, and the Hong Kong firm began marketing its own hand-held video games. However, the U.S.-based company's eventual success in the U.S. market influenced most other producers in Hong Kong to concede the U.S. market and to look to the European market instead.

<sup>1/</sup> "Hong Kong Studies Electronic Toy Exports," AEU, Dec. 1982, p. 32ff.

<sup>2/</sup> "Programmable and Handheld TV Games are Attracting Maker Interest in Hong Kong," Electronics, May 1978, p. 148ff.

## Taiwan

Coin-operated video games

Since 1978, Taiwan has been the chief source of coin-operated video games which allegedly infringe on copyrighted audio-visual works. <sup>1/</sup> Initially, unlicensed copiers in Taiwan exported arcade video games, complete with cabinets, to the United States, Japan, Europe, the United Kingdom, Canada, and other less significant markets. By 1982, most of the alleged infringers had adopted the strategy of exporting just the game logic boards to foreign sites where the logic boards would be assembled with locally manufactured cabinets. This practice served the purpose of both reducing transportation costs and import duties and making detection of the infringing games more difficult at customs ports of entry.

According to import specialists of the U.S. Customs Service interviewed during this investigation, testing equipment from copyright holders loaned to the Customs Service in 1982 improved the ability of import specialists to detect which imported game logic boards were infringing on copyrighted works. However, to circumvent these efforts, by mid-1983, most alleged infringers in Taiwan were exporting the programmed EPROM's in separate shipments from the rest of the logic board components, with the EPROM's to be assembled to the printed circuit boards in the foreign countries. This practice has made protection of copyrights for video games extremely difficult. In addition, the import specialists explained that EPROM's bearing infringing programs are usually declared to be unprogrammed integrated circuits at only a fraction of their true value, thus avoiding significant duty assessments. Furthermore, this practice of infringement frustrates the collection of official statistics measuring international trade in coin-operated video games and parts and leads to the understatement of the actual volume of trade.

Video game systems and software

A U.S.-based company established its principal manufacturing facilities for video game systems in Taiwan in 1980, and by mid-1983, had also transferred the production of home computers to Taiwan. Another U.S.-based company began manufacturing some of its video game systems in Taiwan in 1981. Some independent U.S.-based suppliers of game software assemble game logic boards in Taiwan; only a few assemble finished cartridges there. Most U.S.-based firms operating in Taiwan use a mixture of components manufactured in Taiwan, Japan, and the United States and use local contractors for some of the assembly or processing of the components.

<sup>1/</sup> This information was developed from interviews with representatives of firms which produce coin-operated video games in the United States and Japan and with import specialists of the U.S. Customs Service.

## Europe

Coin-operated video games

Officials of both U.S. and Japanese producers stated that, as in both Japan and the United States, piracy of coin-operated video games became prevalent in Europe in 1978. Typically, game logic boards programed with copyrighted games were copied in Taiwan and then exported to Italy, where they were assembled with locally produced cabinets. With high transportation charges and the dollar appreciating in terms of most European currencies, the rising prices of most U.S.-made arcade video games tempted the majority of European operators to turn to the less expensive infringing games. However, the quality of the infringing games was reportedly inferior to that of U.S.-made games. The reduction in quality stifled player interest in the arcades. Reduced revenue per machine lengthened the payback period of even the infringing games. Furthermore, poor-quality counterfeited games hurt the reputations of some U.S. producers. Many European arcade operators went out of business, and those that remained found it difficult to purchase the high-priced U.S.-made games. By the end of 1981, U.S. exports of coin-operated video games had nearly halted.

The current European market is supplied by three sources: (1) subsidiaries of U.S. and Japanese firms which import game logic boards from their parent companies and assemble them with locally made cabinets or market them as conversion kits; 1/ (2) local producers which license copyrighted games from the United States and Japan; and (3) cabinetmakers (usually in Italy) which import infringing game logic boards from the Orient (usually Taiwan). 2/ Competition with infringers discourages the Japanese manufacturers from marketing their products in Europe more aggressively. Until recently, no research and development for arcade video games had been done in Europe. Approximately one-half of the quantity of new, coin-operated video games shipped to operators in Europe in 1983 were conversion kits. A shortage of laser disc players prevented U.S. producers from exporting laser disc video games to Europe in 1983.

Video game systems

The disenchantment of European video game players with the poor quality of arcade games has limited the market for video game systems. However, according to a major U.S. exporter, the limited choices in television programing invites the alternative use of televisions in Europe. 3/ Consumers affluent enough to own a television are not discouraged by the price of imported video game systems.

1/ Market conditions or local laws sometimes require subsidiaries of U.S. and Japanese arcade video game producers to form joint ventures with European companies.

2/ There are no significant manufacturers of logic boards for coin-operated video games in Europe.

3/ Michael Schrage, "U.S. Video Games Set to Blitz World Market," The Washington Post, Mar. 20, 1983, p. G1.

The European market for video game systems is supplied by one local manufacturer (which also produced video game systems in the United States from 1972 to 1983) and three U.S.-based suppliers. One of these U.S. firms exports the systems directly from its production facilities in Hong Kong, and the other two export from the United States.

Game software

A major distributor and exporter of software stated that U.S.-made game cartridges for video game systems and home computers are preferred in Europe over game software from other sources. Cartridges from the United States have a reputation for higher quality in production standards and in graphics, game play, and sound. However, countries which require programs to be written in the local language and countries which do not allow prepayment reportedly present barriers to U.S. exports. European video game players tend to take more interest in sports-oriented games than their counterparts in the United States.

The chief competition for U.S. producers in the European market is from counterfeit game software which duplicates copyrighted programs carried on the EPROM's of U.S.-made game cartridges. Industry sources indicate that most of the counterfeit software is made in Taiwan, Hong Kong, and the Republic of Korea.

Hand-held video games

Hand-held and tabletop video games are still very popular in Europe because of the large portion of the population without household television. Demand is strongest for sports games. Nearly all of the hand-held video games in the European market are imported from Hong Kong, Japan, and the United States. Games marketed by U.S.-based suppliers have a reputation for high quality. Games produced in Hong Kong and Taiwan by foreign firms usually have the advantage of lower price. According to a principal U.S. exporter, hand-held video games produced in Japan have a minority share of the European market, because they tend to be priced above games by manufacturers based in Hong Kong or Taiwan but do not carry a reputation for quality as high as that attributed to games by U.S. companies.

## Other Markets

U.S. producers were successful at marketing coin-operated video games in Canada for a period, but the strength of the U.S. dollar and the value-added tax contributed to make arcade games appear overpriced compared with other forms of entertainment. Import substitution policies and higher duties for finished goods than for components make the export of conversion kits the only feasible way to enter the markets in Australia and Latin America. Some countries, such as Singapore and the Philippines, have banned coin-operated video games, because they allegedly caused increased truancy among school-aged children. 1/

1/ "Zapped: Singapore Bans Video Parlors," The Washington Post, Aug. 27, 1982, p. A34.



Similarity in culture and language have aided U.S. producers in gaining major shares of the rapidly rising markets for game software, video game systems, and home computers in Canada, Australia, and the Republic of South Africa.

#### U.S. IMPORTS

##### Importers

Over 200 companies imported video games and components during January 1978-June 1983. Respondents to the Commission's questionnaire probably together accounted for over 95 percent of the value of U.S. imports during that period. Forty-eight importers responded to the Commission's questionnaire, 31 of which also manufactured video games or components in the United States. Nine of these producers were foreign owned. The 22 U.S.-owned manufacturers together accounted for 80 percent of the value of the imports in 1982, the 9 foreign-owned manufacturers producing in the United States together accounted for 18 percent, and the 17 companies not involved in manufacturing domestically together accounted for only 2 percent of the imports.

##### Coin-operated video games

Eleven companies imported coin-operated video games during 1978-83, with an additional six importing only logic boards for arcade video games. Subsidiaries of Japanese producers accounted for the bulk of the imports of complete games.

##### Video game systems

Ten firms imported video game systems at some time during 1978-83. U.S. producers with overseas production facilities accounted for the majority of imports. Five companies imported home computers, including two U.S.-based manufacturers of video game systems.

##### Game software

Seventeen companies imported game software during the period. Eight of these firms produced components for video game cartridges in the United States and assembled the components overseas, sometimes combining them with foreign-made components.

##### Hand-held video games

Ten firms imported hand-held video games during the period. The majority of imports were accounted for by U.S.-based manufacturers using overseas production facilities.

#### Imports for Consumption

Imports of all types of video games and components rose annually during 1978-82, from \$84 million to \$766.5 million (table 15). Imports in January-June 1983, however, were 31 percent less than the in January-June 1982.

Table 15.--Video games and components: U.S. imports for consumption, by principal sources, 1978-82, January-June 1982, and January-June 1983

(In thousands of dollars)							
Source	1978	1979	1980	1981	1982	January-June--	
						1982	1983
Japan-----	778	3,990	23,749	55,601	171,637	74,488	43,026
Hong Kong and Taiwan-----	73,674	154,161	298,012	402,124	485,061	233,166	134,387
Singapore and Philippines---	6,184	19,500	21,587	44,035	90,828	21,449	53,941
All other-----	3,337	323	680	30,826	18,936	6,734	1,980
Total-----	83,973	177,974	344,028	532,586	766,462	335,837	233,334

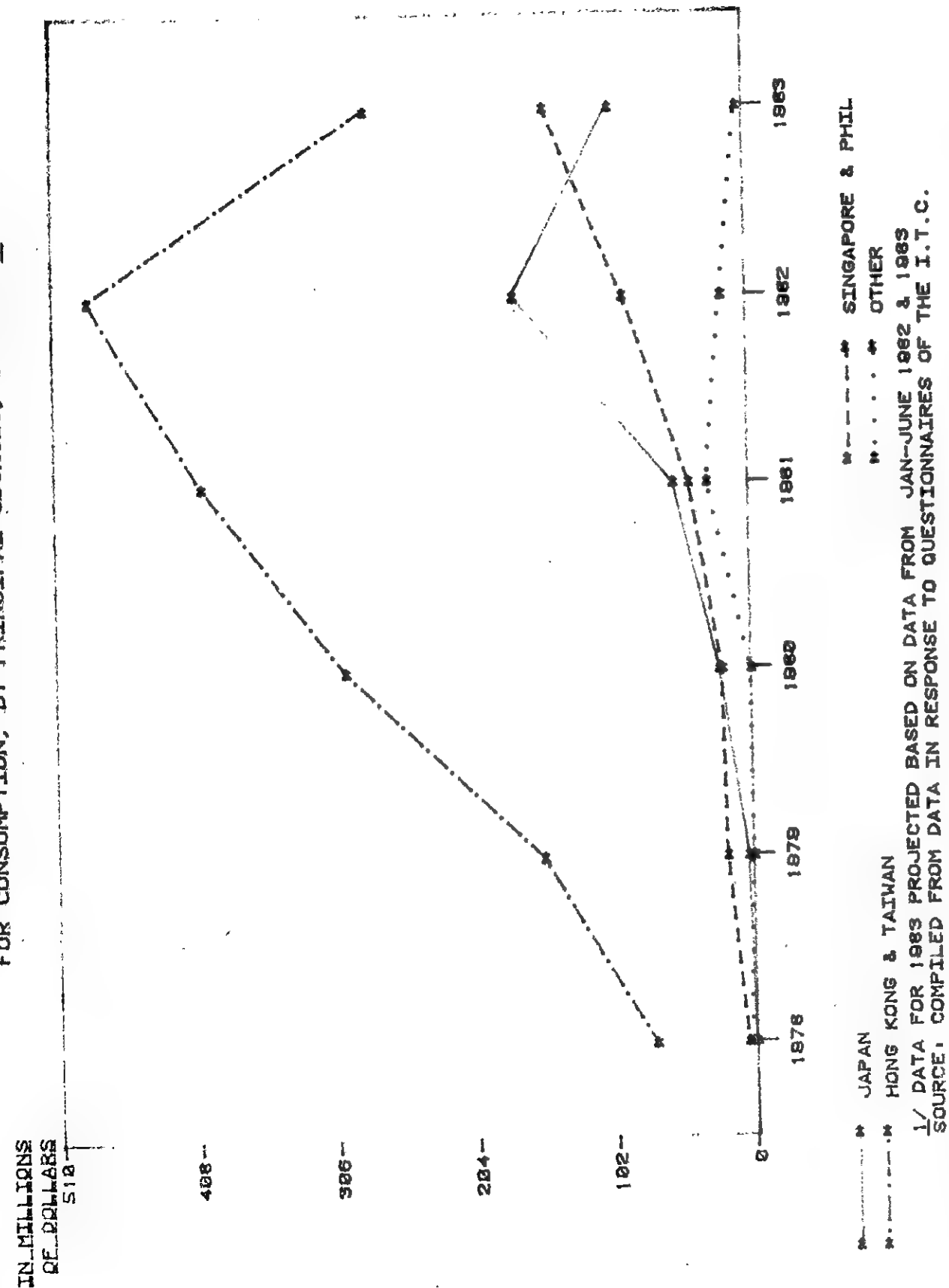
Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Together, Hong Kong and Taiwan supplied over one-half of the imports of video games and components in each year during the period (fig. 5). Imports from Hong Kong and Taiwan rose from \$73.7 million to \$485.1 million during 1978-82, but were 42 percent (\$98.8 million) less in January-June 1983 than those in January-June 1982. Imports from Japan grew from \$0.8 million to \$171.6 million during 1978-82, but also fell by 42 percent during January-June 1983. On the other hand, imports from Singapore and the Philippines not only climbed from \$6.2 million to \$90.8 million during 1978-82, they also more than doubled during January-June 1983 compared with those in the corresponding period of 1982. The principal imports from Hong Kong and Taiwan were video game systems and hand-held video games, imports from Japan consisted largely of coin-operated video games and logic boards, and Singapore and Taiwan specialized in the assembly of logic board components and video game cartridges.

Imports of complete video games increased from \$80.9 million to \$575.9 million during 1978-82, but, at \$155.4 million, were 43 percent less during January-June 1983 than those in January-June 1982 (table 16). Hand-held video games accounted for over one-half of the value of total imports of complete games during 1978-80. After 1980, video game systems accounted for over one-half of the value.

Imports of components for video games increased geometrically during 1978-82, from \$3.1 million to \$190.6 million (table 16). Unlike imports of complete games, imports of video game components continued to rise during January-June 1983, up 23 percent over those in January-June 1982 to

FIGURE 5. VIDEO GAMES AND COMPONENTS: U.S. IMPORTS FOR CONSUMPTION, BY PRINCIPAL SOURCES, 1978-83 1/



\$77.9 million. Components for game logic boards accounted for roughly one-half the value of all imported video game components during the entire period.

Table 16.--Video games and components: U.S. imports for consumption, by types 1978-82, January-June 1982, and January-June 1983

Type	(In millions of dollars)					January-Jun	
	1978	1979	1980	1981	1982	1982	1
Complete video games	80.9	170.2	317.2	446.1	575.9	272.6	1
Components for video games	3.1	7.8	26.9	86.5	190.6	63.2	
Total	84.0	178.0	344.1	532.6	766.5	335.8	2

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

#### Coin-operated video games

Imports of coin-operated video games were negligible in 1978 and 1979, but rose to \$12.4 million in 1980 and \$60.9 million in 1981. The popularity of a particular copyrighted game led to another substantial increase in imports in 1982, but as the game began to exhaust its player appeal in 1983, imports fell sharply. 1/ Italy supplied all of the imports of arcade video games in 1978, but Japan became the leading supplier the following year. Japan was also the dominant supplier of logic boards for arcade video games, which became a significant item of trade in 1981.

#### Video game systems

Imports of video game systems were quite small in 1978 and 1979, became significant in 1980, more than tripled during 1980-82, but declined significantly in January-June 1983. 2/ Hong Kong and Taiwan were the leading suppliers during 1978-83.

Home computers were first imported in 1981, and although the value has approximately doubled on an annual basis, the volume is relatively small. 2/ As of June 1983, Japan was the leading source. In addition, a U.S. manufacturer assembled home computers in the Philippines.

1/ Data for 1978, 1979, 1982, and 1983 were withheld to avoid disclosing operations of individual companies.

2/ Data were withheld to avoid disclosing operations of individual companies.

Game controllers were first imported in 1981; such imports reached \$6.1 million in 1982 and should surpass that figure in 1983. <sup>1/</sup> Hong Kong and Taiwan are the principal suppliers.

#### Game software

Imports of video game cartridges, which were nil in 1978, started in 1980 and reached \$39.2 million in 1982. <sup>2/</sup> Imports in January-June 1983 were 8 percent below those in the corresponding period of 1982, however, as orders were affected by the inventory overhang at retail from 1982. Most imported video game cartridges contain integrated circuits that have been programed in the United States, hence the significant U.S. exports of game logic board components. Hong Kong and Taiwan were the chief suppliers of video game cartridges in 1982 and 1983.

Imports of logic boards for video game cartridges and components for such logic boards were more than twice as large as imports of finished game software in 1982. <sup>3/</sup> Taiwan, Singapore, and Hong Kong were the most important sources of logic boards for game software, and Singapore and the Philippines were the leading suppliers of components for such logic boards.

Cassette recorders for home computers, supplied principally by Singapore, Hong Kong, and Japan, are rapidly becoming a significant import item. <sup>4/</sup>

#### Hand-held video games

Imports of hand-held video games peaked in 1980, more than doubling the 1978 volume, and accounted for the bulk of the total value of video game imports in each year during 1978-80. The \$59.3 million value of hand-held video game imports in 1982 was a fraction of such value in 1980. <sup>5/</sup> The principal sources in 1982 were Hong Kong, Taiwan, and Japan. Imports of components for hand-held video games achieved a significant level in 1982. Such components are made in Hong Kong and Taiwan.

#### Imports under TSUS item 807.00 <sup>6/</sup>

There were no imports of video games or components under TSUS item 807.00 in 1978; such imports in 1979 were insignificant. U.S. producers began more

<sup>1/</sup> Data for 1981 and 1983 were withheld to avoid disclosing operations of individual companies.

<sup>2/</sup> Data for 1980 and 1981 were withheld to avoid disclosing operations of individual companies.

<sup>3/</sup> Data for 1980-83 were withheld to avoid disclosing operations of individual companies.

<sup>4/</sup> Data for 1980-83 were withheld to avoid disclosing operations of individual companies.

<sup>5/</sup> Data for 1978-81 and 1983 were withheld to avoid disclosing operations of individual companies.

<sup>6/</sup> Under TSUS item 807.00, imported articles assembled in foreign countries with fabricated components that have been manufactured in the United States are subject to duty upon the full value of the imported product less the value of the U.S.-fabricated components contained therein.

fully utilizing the provision of TSUS item 807.00 in 1981 after Taiwan and Hong Kong had lost eligibility for duty-free entry under the GSP program with regard to TSUS item 734.20 because they had exceeded the competitive-need limit in 1980. <sup>1/</sup> Consequently, imports under TSUS item 807.00 climbed from \$21 million in 1980 to \$494 million in 1982. <sup>2/</sup> Although every type of video game and nearly every type of video game component has been imported under TSUS item 807.00, the principal products imported under this provision were video game systems and logic board components for video game cartridges. The leading sources of such imports are Hong Kong, Taiwan, Singapore, and the Philippines (table 17).

Table 17.--Video games and components: U.S. imports under TSUS item 807.00, by principal sources, 1980-82, January-June 1982, and January-June 1983

Source	(In thousands of dollars)				
	1980	1981	1982	January-June---	
				1982	1983
Taiwan and Hong Kong----	14,000	227,448	432,136	229,519	105,472
Singapore and the Philippines-----	6,180	20,282	55,773	18,348	34,626
All other-----	781	1,337	6,315	2,884	5,448
Total-----	20,961	249,067	494,224	250,751	145,546

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Imports under item 807.00 accounted for just 6 percent of total imports of video games and components in 1980. However, this ratio increased in 1981 and 1982 to 47 and 64 percent, respectively. In 1982, imports under item 807.00 accounted for 89 percent of all the imports of video games and components from Hong Kong and Taiwan.

<sup>1/</sup> Sec. 504(c) of the Trade Act of 1974 provides that an eligible article will not receive duty-free treatment if it is the product of a beneficiary country which in the preceding year (1) supplied 50 percent or more by value of the U.S. imports of the article, or (2) supplied imports valued at or above the competitive-need limitation. (This amount, which was \$52.3 million in 1982, is adjusted annually on the basis of the percentage of growth in the U.S. gross national product).

<sup>2/</sup> Data for 1979 were withheld to avoid disclosing operations of individual companies.



## THE U.S. MARKET

## Description of the Market

Coin-operated video games

An industry survey in 1981 indicated that approximately 90 percent of those who play video games in arcades are male, and 80 percent are teenagers. Arcades function as a socialization location for teenage males. The video games at the arcades provide the entertainment. A major part of the appeal of the games is that players want to impress their peers with high scores. <sup>1/</sup> Many teenagers find the arcades or street locations for coin-operated video games more suitable for this kind of social interaction than playing video game systems at home. Furthermore, arcade video games generally have superior graphics to home video games, because their greater memory capacity permits more detailed programming.

Despite the social function of the arcades, the arcades depend on the entertainment appeal of the video games to determine their financial success. A series of factors began working against such financial success in 1982. The market became saturated with game machines. <sup>2/</sup> With the proliferation of game machines in both arcade and street locations which competed for the attention of a finite number of players, the weekly revenue generated by each machine declined. In an effort to increase player traffic, operators at many locations lowered their price per play from 25 cents to as low as 10 cents. <sup>3/</sup> The resultant price war among operators further reduced the weekly revenue per machine to an estimated one-third less in 1983 than in 1982. This, in turn, lengthened the payback period--the length of time it would take a machine to earn enough revenue to offset the cost of purchasing the machine by the operator. It is estimated that of the 9,000 "parlors of coin" in operation in 1982, 20 percent went out of business in 1983. With a large portion of the operators experiencing financial difficulties, shipments by manufacturers in 1983 declined by approximately one-half from those in 1982 as most operators postponed purchases of new video games. Declining revenues for coin-operated video game manufacturers translated into smaller funds for research and development to create games with player appeal.

In addition, nearly every arcade game manufacturer responding to the Commission's questionnaire cited copyright infringement as a substantial factor contributing to their loss of sales, with infringers typically supplying 30 percent of the market for popular games. <sup>4/</sup> Since infringers do not have research and development or royalty expenses in their cost structures, they often sell the games at a price 40 percent below that of non-infringing games. As manufacturers reduced their allocations for R. & D. because of reduced revenues, new games were often variations on the themes of earlier successful games.

<sup>1/</sup> Lynn Langway, "Invasion of the Video Creatures," Newsweek, Nov. 16, 1981, p. 90f.

<sup>2/</sup> Michael Schrage, "Video Arcade Industry is Suffering A Glut," The Washington Post, Nov. 23, 1982, p. C8.

<sup>3/</sup> N. R. Kleinfeld, "Video Game Industry Comes Down to Earth," The New York Times, Oct. 17, 1983, p. D4.

<sup>4/</sup> Carol Pogash, "The Latest Video Game: Electronic Rip-off," The Washington Post, July 4, 1981, p. D8.

The plethora of similar games and paucity of hit games both confused players and led to their declining interest in arcade games. The combination of reduced average playing time by typical game players, the price war, market saturation, and lack of hit games led to extremely difficult times for both game operators and game manufacturers in 1983.

According to officials of smaller U.S. producers and subsidiaries of Japanese producers interviewed for this study, the influence of the largest manufacturers on the channels of distribution may also limit the potential market. Most arcade games are distributed by subsidiaries or sister companies of major producers. Some smaller manufacturers have contended that when these producers pressure their distributors to market games currently in inventory that are newly projected to have limited player appeal, it absorbs the capital resources of many operators and prevents them from purchasing games with more potential for generating revenue.

Recognizing that their success depended on the ability of machine operators to stay in business and to purchase new games, U.S. manufacturers of coin-operated video games began offering conversion kits in 1982 instead of requiring operators to purchase new games complete with cabinets. Representatives of U.S. producers interviewed for this study stated that in doing so, domestic producers were following the lead of importers. The markets in Europe, the United Kingdom, and Japan had become so saturated with complete games in 1981 that in 1982, sales of conversion kits far outnumbered sales of complete games. Smaller producers with less capital invested in cabinet manufacturing facilities have not been as reluctant as the largest firms to market conversion kits.

Another change in the market occurred in July 1983, when a joint venture of three companies in California introduced the first laser disc game marketed in the United States. <sup>1/</sup> (Although a company had previously introduced a game operating on the same principles in Japan, it did not export the game to the United States.) Many coin-operated video game operators postponed purchasing new games during the late summer and early fall of 1983, preferring to wait until late in 1983 to place orders, when 10 manufacturers were scheduled to introduce new games based on the application of interactive laser disc technology at a trade show. <sup>2/</sup> The initial price tag, which ranged from \$4,000 to \$5,000, did not scare off most potential buyers, because conversion kits were planned for the second round of games. These conversion kits would cost much less than a new machine since the existing hardware, such as the laser disc player, the monitor, and the cabinet, could be reused. It was anticipated that the high-resolution graphics and imaginative game play of laser disc games would entice players back to the arcades despite the price of 50 cents per play.

<sup>1/</sup> Cathleen McGuigan and Peter McAlevey, "Mini-Movies Make the Scene," Newsweek, Aug. 8, 1983, p. 79.

<sup>2/</sup> Curt Suplee, "Lasers in the Arcade: Video Games Come of Age With the Latest Technology," The Washington Post, Nov. 30, 1983, p. B1.

Not all operators of coin-operated video games are likely to benefit from the anticipated renaissance of the industry to be generated by laser disc video games. According to representatives of U.S. producers interviewed during this investigation, there are three tiers of locations for coin-operated video games: A, B, and C locations--excellent, average, and marginal, respectively. "A" locations account for 10 percent of the total, B for 50 to 60 percent, and C for 30 to 40 percent. New games are usually sold to A locations first. Games that do well in A locations are then ordered by B locations. C locations often buy used games from A and B locations. In 1983, B locations became marginally profitable, and C locations were losing money. Since laser disc game machines are designed to be converted to new games periodically, C locations are not going to have access to used game machines. Few of the typically capital-short C locations will be able to invest in the new laser disc games; thus, attrition in the number of C locations is likely to continue.

#### Video game systems

Until 1983, the home video game system industry relied on the promotion of various hit games to sell the systems. Although the success of one company was chiefly the result of the high quality of its sports games, most system suppliers licensed games proven to be popular in the arcades. One system supplier gained a reputation for high-resolution graphics, and another company had the advantage of having the largest number of games designed to be played on its hardware.

The chief market for video game systems is households with male children between the ages of 8 and 18. Systems are usually purchased to play specific games or groups of games that a child has been exposed to in the arcades or at other households. It is estimated that the portion of all households owning video game systems grew from 4 percent in 1980 to 17 percent in 1982. <sup>1/</sup> However, the penetration of households with teenage males was much higher.

Two approaches were taken by systems suppliers to increase the percentage of households owning video game systems. The first, taken in late 1982, was to lower the price of the hardware to make the systems available to less affluent customers. The second approach was to upgrade the quality of the second generation of systems by adding more ROM power to improve the quality of the graphics, sound, and game play and to allow the performance of computer functions with the addition of a keyboard. This second approach was aimed at broadening the appeal to more affluent consumers who might have been exposed in the work place to the utility of personal computers and would be attracted by the computer capabilities of the more sophisticated game player, at creating a trade-up market, and at providing machines that could more satisfactorily duplicate the quality of the games played in arcades. <sup>2/</sup> By the fall of 1983, all of the major video game system suppliers offered home computers and/or video game systems which could be expanded to home computers.

An additional reason for entering the home computer market was to offer a product with higher profit margins than those afforded by game consoles, where

<sup>1/</sup> Kleinfield, op. cit.

<sup>2/</sup> Laura Landro, "Warner's Atari is Trying to Regain Top Spot in Consumer Electronics," The Wall Street Journal, July 6, 1983, p. 33.

price cutting in an effort to expand the market for first-generation games and to increase market share had sliced deeply into profits. However, computer manufacturers responded to this encroachment into their market by lowering prices on their home computers in 1983 and by promoting the game-playing capabilities of their machines. As a result, profit margins on home computers became similar to margins on video game consoles--virtually nil. <sup>1/</sup>

Computer functions for game players took on added importance in 1983 as the previously described dearth of hit games in the arcades took its toll on the demand for home machines to play games introduced in the arcades.

#### Game software

Until 1981, nearly all home video game cartridges were supplied by producers of the hardware for video game systems. However, by 1983, at least 30 independent companies manufactured game cartridges as their principal product. In addition, over 200 suppliers of computer software added video games to their repertoire of programs available on discs.

Unlike hardware suppliers, software producers were not hurt by slumping sales of video game systems in late 1982 through 1983. After all, consumers still bought new game cartridges to play on old systems, and by mid-1983, an estimated 16 million U.S. households owned video game systems, and another 2.5 million owned home computers. Instead, software suppliers were hurt in 1983 by the lack of hit games in arcades to stimulate interest in home games. Furthermore, a huge backlog of inventory of cartridges at the retail level which accumulated during the Christmas season of 1982, much of it from a single manufacturer, made retailers reluctant to purchase sizable orders in 1983. <sup>2/</sup> Indicative of this severe inventory backlog was the fact that ROM suppliers built memories for an estimated 90 million to 100 million game cartridges in 1982, but for only 50 million to 60 million in 1983; <sup>3/</sup> meanwhile, the number of cartridges sold at retail was projected to be higher in 1983 than in 1982. <sup>4/</sup>

<sup>1/</sup> Pollack, op. cit., p. 1; Laura Landro and Susan Chase, "'Adam' Bolting Pricing Tactics in Computers," The Wall Street Journal, June 9, 1983; David Stipp, "Texas Instruments is Seen Getting a Boost from Move to Quit Home-Computer Field," The Wall Street Journal, Oct. 31, 1983, p. 2; Bill Abrams, et. al., "Hawking Hardware: Home Computer Firms Begin to See Marketing as Industry's Salvation," The Wall Street Journal, Sept. 12, 1983, p. 21; Laura Landro and James A. White, "Computer Firms Push Prices Down, Try to Improve Marketing Tactics," The Wall Street Journal, Apr. 29, 1983, p. 35, and Susan Dentzer, with Peter Mc Alevey and Connie Leslie, "The Wolf at Warner's Door," Newsweek, Oct. 24, 1983, p. 105.

<sup>2/</sup> Michael Schrage, "The High-Tech Dinosaurs," The Washington Post, July 31, 1983, p. F1.

<sup>3/</sup> Sabin Russel, "Video Game Slump Causes Glut of Dedicated ROM's," Electronic News, Sept. 5, 1983, p. 1.

<sup>4/</sup> Kathryn Harris, "Video Game Industry in Shakeout," Los Angeles Times, Apr. 30, 1983, p. 1.

Although the home computer market provided a new opportunity for game software producers, software makers were forced to speculate which brands of hardware would be popular with the consumer and then manufacture cartridges or discs to be compatible with two or three of these hardware systems. <sup>1/</sup>

Perhaps the most basic problem for software producers, however, is that the market is not large enough to support the number of competitors currently in the field. <sup>2/</sup>

#### Hand-held video games

The market for hand-held video games peaked in 1980. The proliferation of video game arcades and the jump in the proportion of households owning video game systems sharply cut the demand for hand-held video games. However, the major U.S.-based participants in the hand-held video game market were not adversely affected by this development, because three of the five entered the video game system market, a fourth became a successful supplier of game software, and the remaining firm became one of the leading suppliers of home computers. <sup>3/</sup>

#### Consumption

The apparent U.S. consumption of all types of video games combined grew in each year during 1978-82, from \$215 million to \$3.7 billion (table 18). <sup>4/</sup> However, in January-June 1983, consumption fell by 27 percent from that in January-June 1982 to \$1.2 billion. Imports did not rise as rapidly as U.S. producers' shipments to the U.S. market during 1979-82 and dropped more quickly in January-June 1983. Consequently, the share of consumption accounted for by imports decreased from 44 percent in 1979 to 12 percent in January-June 1983.

#### Coin-operated video games

The apparent consumption of coin-operated video games increased without interruption during 1978-82, from \$39.9 million to \$836.2 million, but fell by 62 percent during January-June 1983, when the market collapsed, to \$186.7 million (table 19). The share of apparent consumption supplied by imports rose to 9 percent in 1981 and still higher in 1982, but dropped slightly in January-June 1983 as consumption of both U.S.-produced and imported arcade video games declined in the shrinking market.

<sup>1/</sup> "The Challenge of Cartridges," *Inc.*, December 1982, p. 23.

<sup>2/</sup> Laura Landro, "Video-Game Firms Face Tough Christmas As Industry Approaches a Major Shakeout," *The Wall Street Journal*, Sept. 29, 1983, p. 33.

<sup>3/</sup> "Why Electronic Games Will be Hard to Find," *Business Week*, Nov. 19, 1979, p. 52.

<sup>4/</sup> "Video Games are Suddenly a \$2 Billion Industry," *Business Week*, May 24, 1982, p. 784.

Table 18.—Video games: U.S. producers' domestic shipments, imports for consumption, apparent consumption, shipments of imported video games, and domestic consumption, 1978-82, January-June 1982, and January-June 1983

Period	Producers' domestic shipments (1)	Imports for consumption (2)	Apparent consumption (3)	Ratio of (2) to (3) (4)	Shipments of imports (5)	Domestic consumption (6)	Ratio of (5) to (6) (7)
		1,000 dollars		Percent	1,000 dollars		Percent
1978	2/	2/	214,614	2/	2/	149,646	2/
1979	218,073	170,156	388,229	43.8	129,384	347,457	37.2
1980	591,324	317,221	908,545	34.9	315,466	906,790	34.8
1981	1,653,906	446,096	2,100,002	21.2	609,810	2,263,716	26.9
1982	3,101,896	575,911	3,677,807	15.7	763,969	3,865,865	19.8
January-June 1982	1,450,135	272,570	1,722,705	15.8	454,245	1,904,380	23.9
1983	1,094,465	155,379	1,249,844	12.4	192,598	1,287,063	15.0

<sup>1/</sup> Includes shipments to the U.S. market by foreign and domestic producers.

<sup>2/</sup> Certain data are withheld from publication to prevent release of information which would reveal the operations of individual companies.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.



Table 19.--Video games: Apparent U.S. consumption, by types, 1978-82, January-June 1982, and January-June 1983

(Quantity in thousands of units; value in thousand of dollars)					
Period	Coin-operated: video games	Video game systems	Home computers	Game software	Hand-held video games
	Quantity				
1978-----	24	1,522	-	1/	1/
1979-----	1/	1,190	1/	1/	8,971
1980-----	158	2,117	1/	9,557	11,207
1981-----	355	6,202	130	33,981	4,107
1982-----	439	10,356	653	79,589	6,583
January-June--					
1982-----	254	5,257	128	31,685	951
1983-----	102	3,470	970	29,782	2,367
	Value				
1978-----	39,924	75,033	-	1/	1/
1979-----	1/	78,322	1/	1/	192,318
1980-----	268,130	285,178	1/	103,928	241,916
1981-----	704,075	787,231	29,819	464,361	114,516
1982-----	836,196	1,204,257	234,747	1,268,575	134,032
January-June--					
1982-----	491,883	561,262	86,297	546,929	36,334
1983-----	186,738	378,839	201,700	458,957	23,610

1/ Certain data have been withheld from publication to prevent the release of information about individual companies.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

#### Video game systems

The apparent consumption of video game systems dropped by 22 percent in quantity in 1979 compared with that in 1978 as consumers lost interest in dedicated games (table 19). The burgeoning popularity of programmable video game systems and the efforts of systems suppliers to develop game programs with player appeal resulted in consumption increasing more than seven fold during 1979-82 to 10.4 million units, valued at \$1.2 billion. 1/ However, conversion of consumer interest to home computers and a lack of appealing game programs led to a one-third decline in the consumption of video game systems in January-June 1983. The share of consumption supplied by imports of video game systems peaked in 1981 and declined significantly in January-June 1983.

1/ John Curley, "Games, Other Luxuries Sell Well As Slump Slows Sales of Durables," *The Wall Street Journal*, May 6, 1982, p. 31.

The apparent consumption of home computers rose from nil in 1978 to 653,000 units, valued at \$234.7 million, in 1982 (table 19). Consumption in January-June 1983 exceeded that for full year 1982 in terms of quantity, rising to 970,000 units. Imports supplied well under 10 percent of the consumption of home computers in 1982.

#### Game software

Apparent consumption of game software increased geometrically during 1978-82, reaching 79.6 million units, valued at \$1.3 billion. The inventory overhang from 1982 led to a 6-percent reduction in consumption in January-June 1983 compared with that in the corresponding period of 1982. In 1982, imports supplied 8 percent of consumption in terms of quantity and 3 percent in value.

#### Hand-held video games

The apparent consumption of hand-held video games peaked at 11.2 million units in 1980, dropped by 63 percent in 1981, and then recovered somewhat to 6.6 million units (valued at \$134 million) in 1982. However, in January-June 1983, hand-held video games lost in the competition with home computers and video game systems for the attention of the consumer. Even though the apparent consumption increased to 2.3 million units during January-June 1983 from 0.9 million units in January-June 1982, actual domestic consumption declined from 1.3 million to 0.9 million units, as most of the hand-held video games imported during January-June 1983 remained in importer's warehouses by June 30, 1983. Imports supplied over one-half of the quantity of hand-held video games in apparent consumption throughout 1978-83.

#### FACTORS OF COMPETITION 1/

U.S. manufacturers of all types of video games indicated during field interviews that they benefit from several competitive advantages which discourage the import of finished video games from foreign-owned producers. (1) The largest U.S. producers have a greater degree of vertical integration than any of the foreign manufacturers. (2) U.S. producers are more likely to have state-of-the-art production processes for the capital aspects of their operations. (3) U.S. companies use assembly facilities in low-wage-rate countries for many labor-intensive production operations. (4) High investment rates help U.S. producers maintain their lead in product innovations, quality of construction, and efficient manufacturing processes. (5) The largest U.S. firms benefit from long-term relationships with arcade operators and retailers, some for products dating to the era before video games, in which the producers have developed reputations for high-quality and speed of service.

1/ The information used in this section of the report was obtained during interviews with corporate executives representing domestic manufacturers, U.S. subsidiaries of Japanese producers, and independent distributors of video games, and from responses to questionnaires of the U.S. International Trade Commission.

U.S. producers and importers were asked to assess the competitive position of U.S.-made video games and components versus foreign-made products with regard to nine factors of competition. The results of this survey are located in Appendix C. U.S.-made products generally scored highest in terms of warranties and service, quality, shorter delivery time, overall availability, and terms of sale. Foreign-made video games and components scored highest in the areas of lower purchase price, ability to supply products at various market price levels, and exchange rate advantage. Table 20 provides an assessment by U.S. producers and importers of the overall competitive advantage of U.S.-made video games and components versus foreign-made products by types. This rating scheme generally indicated higher scores for U.S.-made coin-operated video games, video game systems, software, and consoles, and disc drives for home computers. On the other hand, high scores were given to hand-held video games made in Japan, Taiwan, and Hong Kong; video game controllers and computer keyboards made in Taiwan and Hong Kong; and game logic boards made in Japan and Taiwan.

Some factors of competition are more significant to specific types of video game products than others. The principal factors of competition are (1) providing games with player appeal, (2) production technology, (3) marketing, and (4) product quality and price.

#### Providing Games With Player Appeal

The ability of a firm to create or license appealing game ideas and then develop these ideas into games with captivating play action has been the key competitive factor in the U.S. video game market. <sup>1/</sup> Coin-operated video game machines, home video game systems, video game software, and hand-held video games all depend on attracting consumer interest in order to be successful. The success of coin-operated games in arousing consumer interest essentially created the markets for home video game systems and game software and revitalized the hand-held video game market.

<sup>1/</sup> Sam Smutherland, "Meet Scrutinizes Videogame Shifts," Billboard, Apr. 23, 1983, p. 55.

Table 20.--Assessment by U.S. producers and importers of the overall competitive position of U.S.-made video games and components versus foreign-made products during 1978-83, by types

Type	Average rating <sup>1/</sup> of the overall competitive advantage of U.S.-made video games and components versus products made in--				
	Japan	Taiwan	Hong Kong	European Community	Other
Coin-operated video games----	2.3	2.2	2.0	3.0	1.0
Video game systems-----	2.5	2.2	2.5	3.0	3.0
Home computers-----	2.3	2.5	2.6	2.0	2.7
Video game software-----	2.4	2.5	2.6	2.0	3.0
Hand-held video games-----	1.5	1.5	1.5	3.0	-
Video game consoles-----	2.3	2.4	2.3	3.0	-
Video game controllers-----	2.0	1.6	1.5	3.0	1.0
Game logic boards-----	1.8	1.6	3.0	2.0	-
Custom-made video game computer chips-----	2.0	2.0	2.5	2.5	2.0
Keyboards for home computers-----	2.5	1.0	1.0	3.0	-
Disc drives for home computers-----	3.0	3.0	3.0	3.0	3.0
Cassette recorders for home computers-----	3.0	-	1.0	1.0	-

<sup>1/</sup> The questionnaire respondents listed the competitive advantage as being "domestic," "foreign," or "same." A score of 3 was assigned to a domestic advantage, 2 to same, and 1 to a foreign advantage. An average rating close to 3.0 indicates that a consensus of the respondents listed a domestic advantage; the closer that the average rating is to 1.0, the greater the consensus is toward a foreign advantage.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

#### Research and development

Nearly all copyrighted video games are the product of research and development in the United States and Japan. <sup>1/</sup> Although U.S. firms have invested a significant portion of their revenue into R. & D., industry sources indicate that Japanese companies tend to re-invest an even higher portion of their income into research and development than most U.S. manufacturers. These sources attribute the popularity of Japanese-developed games to the higher research and development budgets.

<sup>1/</sup> Ted Knutson, "The Martians Have Landed and They Talk Computer," The Washington Post, Nov. 5, 1980, p. D3.

Whereas many games have cross-national appeal, the popularity of a significant portion of video games is based on nuances of language and culture. Recognizing this, some Japanese manufacturers of video games perform R. & D. in the United States. Similarly, some U.S. producers have begun R. & D. in Europe.

### Licensing

Industry sources indicated that, since the bulk of sales of video game cartridges are games that have been "hits" in arcades, the heaviest burden for research and development falls on coin-operated video game producers. Pressure to create and discover games with hit potential is intense. Although a small number of arcade game producers pride themselves in developing games in-house, most are anxious to obtain the rights to any game copyrights which might improve their revenues.

The search by domestic arcade game producers for game concepts coincides with the preference of some video game producers in Japan not to compete in the U.S. market in terms of shipping complete games. Instead, these companies license certain rights to their copyrighted games to U.S. producers in order to share in the wealth of the U.S. market. Separate licensing agreements are usually made for the rights to the coin-operated video game market, the home video game cartridge market, and the computer game market. Agreements are usually made with the software producers only after a game is proven to be popular in the arcades. 1/ These agreements typically provide the Japanese copyright owner a flat contract fee plus a royalty for each game sold. According to field interviews, the contracts often include a guarantee by the U.S. manufacturer of the minimum number of games that will be sold. Frequently, the license agreement requires the U.S. producer to use game logic boards built by the Japanese copyright owner. Occasionally, the rights to other markets outside of Japan are sold to U.S. manufacturers.

Although both U.S. arcade game producers and Japanese video game manufacturers license copyrighted games to domestic makers of game software, they do not actually compete with each other directly. Any successful arcade game will be in demand by software companies. The size of the contract between copyright owner and licensee will depend on the anticipated revenue generation by the game rather than on competition between copyright owners. Industry sources state that it is common for game cartridge manufacturers and hand-held video game producers to have contracts with both U.S. arcade game producers and Japanese companies for the right of first refusal to produce games developed by them in the respective formats.

1/ Laura Landro, "CBS to Make, Market Home Video Games Under 4-Year Licensing Pact With Bally," The Wall Street Journal, Apr. 21, 1982.

## Production Technology

### Coin-operated video games

Before it entered the video game market, the company that became the largest domestic coin-operated video game manufacturer was producing printed circuit boards both for use in its electromechanical arcade game machines and for sale to manufacturers of other products. According to company officials interviewed for this study, this company's experience in the electronics field and in computer-assisted production gave it a competitive advantage in the emerging arcade video game industry. Revenues during the period of rapid market growth allowed it to maintain state-of-the-art equipment for producing printed circuit boards. Production efficiencies and economies of scale allowed it to enjoy higher profit margins than the rest of the industry. Revenues were used to develop new games, license copyrighted games from Japanese producers, and to purchase companies which supplied components. The latter practice resulted in the company developing a degree of vertical integration unparalleled either domestically or in Japan.

The second largest coin-operated video game producer, capitalizing on its early success in both the arcade video game and home video game markets, also developed economies of scale and a degree of vertical integration which give it an advantage over foreign producers. Most of the remaining domestic manufacturers are on a par with the Japanese arcade game producers in terms of production technology and vertical integration.

### Video game systems

Although the technology for producing video game system hardware has become standardized, U.S.-based producers have developed economies of scale which discourage competition from potential foreign-based manufacturers.

### Game software

According to software distributors interviewed, the high degree of skill required in engineering game programs and the experience of domestic programmers gives U.S. game software producers an advantage over potential foreign-based competitors.

### Hand-held video games

U.S. producers and importers stated that the technology for producing hand-held video games has become standardized, affording no source an advantage in this competitive factor.

## Marketing

### Coin-operated video games

Distance from the market.—The distinct competitive advantage of domestic manufacturers over Japanese producers in marketing arcade video games led



several of the Japanese producers to locate manufacturing and/or assembly facilities in the United States. Not only did the distance from Japan entail high transportation costs for the bulky, complete games, orders were often lost because delivery times were too slow. Lack of programs for after-sales service was a critical drawback for the Japanese, because the games are normally serviced once a week. However, these disadvantages were offset by establishing U.S. subsidiaries and by marketing conversion kits instead of complete games.

Channels of distribution.--The two largest domestic arcade game producers have subsidiary or sister companies that market their games as well as games produced by most of the other U.S. producers. Some smaller domestic arcade game manufacturers allege that these distributors are sometimes pressured to promote games made by their related companies, and this becomes a disadvantage to other producers, including foreign producers, which rely on these channels of distribution.

#### Other

Marketing practices do not give a competitive advantage to either domestic or foreign producers of video game systems, game software, or hand-held video games.

#### Product Quality and Price

##### Coin-operated video games

Although there is some variation among U.S. producers, several industry sources contend that the quality of production for arcade video games tends to be higher for domestic manufacturers than for Japanese companies, whether the games are assembled in Japan or in the United States. With the combined cost of labor and overhead typically amounting to only 12 percent of the direct cost of manufacturing a complete arcade video game, the relative cost of labor does not give producers in either Japan or the United States a competitive advantage.

Domestic and Japanese producers of coin-operated video games obtain certain electronic components worldwide, with little cost advantage to either. Any cost differences have narrowed with the establishment of Japanese subsidiaries in the United States. Game logic boards imported from the parent company in Japan are combined with monitors, usually imported from a third party in Japan, and U.S.-made cabinets and harnesses. These operations do not differ significantly from other U.S. manufacturers, because nearly all import game logic boards from Japanese producers which have licensed the rights to copyrighted games to U.S. firms. <sup>1/</sup> The degree to which U.S. producers rely on game logic boards imported from Japan varies greatly by firm. A large portion of the monitors purchased by domestic arcade game manufacturers are either imported from Japan or have the bulk of their components imported from Japan. Although the coin-operated video games assembled in the United States by subsidiaries of Japanese producers tend to be priced slightly lower than those made by U.S.-based manufacturers, success in the market place is based on the player appeal of the games rather than on price considerations.

However, U.S. producers and importers asserted that price does become an important advantage when considering competition between Japanese-made conversion kits and complete U.S.-made games. Japanese producers reacted more quickly than most U.S.-based firms to the need for arcade game operators to reduce costs by offering conversion kits. Since the conversion kits sold for approximately one-quarter to one-third the price of a complete game, resulting in a savings of as much as \$1,500 on a single game, many operators turned to Japanese subsidiaries as a source of new games when the games offered by Japanese companies were believed to have player appeal comparable with that of games offered by U.S. producers. However, this increased role for imports diminished as more U.S. manufacturers began offering conversion kits. Some U.S. companies feel that it is necessary to sell complete games in order to recover research and development expenses and continue to resist the trend to conversion kits.

Industry sources stated that price is the critical factor for imported infringing games to be competitive in the U.S. market. Infringers usually benefit from the use of both low-cost labor and low-cost, low-quality raw materials in addition to avoiding research and development expenses and licensing fees. Most of these allegedly infringing imports come from Taiwan, but Japan, the Republic of Korea, and Italy are also important sources. Infringing conversion kits currently sell for \$200 to \$300 compared with \$500 to \$700 for domestically made kits by licensed manufacturers and \$1,200 to \$1,500 for infringing upright games compared with \$2,200 to \$2,800 for complete games made by license holders. It is estimated that 20 to 30 percent of all coin-operated video games in the U.S. market are illegal copies. The deprivation of profits to legitimate producers leads to smaller funding for research and development and dimmer prospects for the introduction of hit games. Furthermore, the lower quality of the infringing games damages the reputation of the licensed producers when operators believe they have purchased games from license holders.

According to both domestic and Japanese producers, counterfeit arcade video games are usually misrepresented to be manufactured by license holders. Operators usually erroneously assume that the counterfeit games have the same quality of construction and components as the games they are copying. One method legitimate manufacturers have of gauging the volume of counterfeit games on the market is the number of complaint calls their service departments receive from operators who have--it is learned after inspection--unwittingly purchased infringing games. <sup>1/</sup>

<sup>1/</sup> Additional information on the role of counterfeited coin-operated video games in the U.S. market is presented in Commission Report on Investigation No. 332-158, The Effects of Foreign Product Counterfeiting on U.S. Industry, USITC Pub. 1479, January 1984.

Since it is illegal to import infringing games, importers of such games go to great lengths to avoid detection by the U.S. Customs Service. <sup>1/</sup> As Customs increased its examination of containers for infringing complete arcade video games, counterfeiters responded by deleting the trade dress from the imports, adding the cabinet markings after entry. However, import specialists were trained to recognize copyrighted audio-visual displays, enabling them to detect infringing games by turning the game on. The importers then began bringing in game logic boards, programed with infringing audio-visual work, and assembling them with other components and the cabinets in the United States. When properly appraised, the high average unit value of these declared printed circuit boards was a signal to import specialists that these were actually game logic boards. With equipment donated by domestic manufacturers, Customs was able to display the program of the game logic boards to test for infringing imports. Importers then responded by importing EPROM's separately from the printed circuit boards, making it impossible for Customs to test what program was burned onto the EPROM's. According to Customs officials, in addition to violating copyright laws, importers often declare EPROM's to be unprogramed integrated circuits (programing does not change the physical appearance), with a value not reflecting the worth of the programing on the EPROM's, and thus illegally avoiding the proper import duties. Legitimate manufacturers and the Customs Service are still endeavoring to devise a method to curb the latest practices of copyright infringers.

#### Video game systems and game software

Corporate officials interviewed contend that it is unlikely that potential foreign competitors could match the quality or price of video game systems or game software produced by U.S. suppliers because of the practice of purchasing components and labor internationally by U.S. companies, the economies of scale that they enjoy, and the experience of their research and development departments. Because of the intense competition among themselves and other home computer producers, U.S.-based suppliers of video game systems and game software use international sources of supply for raw materials and electronic components. Where labor costs in their production processes are important, they take advantage of overseas assembly in regions that have low labor rates and high worker productivity. <sup>2/</sup>

According to industry sources, the chief form of foreign-based competition reportedly comes from counterfeiters of game cartridges in the Orient that have used devices to copy programs from the PROM's in cartridges produced by license holders. Counterfeiters usually enter the PROM's or EPROM's and the printed circuit boards separately to avoid detection by customs; they are then assembled in the United States or other export markets with cartridge housings which copy the trade dress of the infringed games.

<sup>1/</sup> U.S. Customs Service, Seattle District, Audio Visual Games: Copyrights, Trademarks, and Product Piracy, 1983, p. 1ff.

<sup>2/</sup> Eduardo Lachica, "Hong Kong Takeover Could Open China to More Trade, Some U.S. Investors Say," The Wall Street Journal, Nov. 8, 1982, p. 34.

There are currently four suppliers of video game systems in the United States. All of these firms are headquartered in the United States. Only one firm does the bulk of its manufacturing domestically. However, this firm uses some imported components. The other three suppliers perform most of their manufacturing and assembly in Hong Kong and Taiwan. However, one does final assembly and packaging in the United States. All three with foreign production facilities incorporate U.S.-made integrated circuits or subassemblies into larger components assembled abroad.

The lone firm with its principal manufacturing operations in the United States quickly gained market share on the basis of the quality and the game play of the cartridges designed for its upgraded hardware introduced in 1982. Its hardware was priced between the two largest suppliers with offshore facilities. By the end of 1983, its four chief rivals in the U.S. home computer market also made extensive use of overseas assembly facilities. <sup>1/</sup> However, all of the major suppliers of home computers were based in the United States. <sup>2/</sup>

Several U.S.-based firms which produce video game system/home computer hardware do some assembly work on game software overseas. All of these firms use integrated circuits programed in the United States; most assemble integrated circuits to printed circuit boards overseas; and some perform the final assembly and packaging in the United States. Only a few software companies which do not manufacture hardware use foreign labor to reduce assembly costs.

Since foreign-based producers were not competitive in the U.S. market for video game systems and software, the reason for U.S.-based companies to establish production facilities offshore was to be more competitive with each other rather than to respond to competition with foreign firms. The chief advantage for U.S. companies to manufacture video game systems and to assemble software offshore was to minimize labor costs. Cost control becomes important as production methods are standardized and the difference between the products of various manufacturers narrows. The experience of two of the U.S.-based suppliers in the electronic game field led to their initiation of production video game systems in the Orient without establishing comparable facilities domestically. A third relocated production facilities from California to the Orient in response to a squeeze on profits that heightened sensitivity to cost control. <sup>3/</sup> Profits were squeezed when prices were reduced to maintain market share and to make the product affordable to less affluent consumers. Worker productivity (output per man hour) was an important consideration as well as low labor rates in locating facilities in Hong Kong and Taiwan.

<sup>1/</sup> Dennis Kneale, "Commodore Hits Production Snags in Its Hot-Selling Home Computer," The Wall Street Journal, Oct. 28, 1983, p. 33.

<sup>2/</sup> David Stipp, "Japanese Firms Find Little Success in the U.S. Small-Computer Market," The Wall Street Journal, Nov. 21, 1983, p. 27.

<sup>3/</sup> "What Sent Atari Overseas," Business Week, Mar. 14, 1983, p. 102ff; and "Atari to Idle 1,700 at California Site, Move Jobs to Asia," The Wall Street Journal, Feb. 23, 1983, p. 6.

### Hand-held video games

Company officials interviewed asserted that hand-held games imported from producers based in the Orient compete effectively in the U.S. market because of their relatively low prices. However, over one-half of the market is supplied by higher priced, U.S.-based producers because of the reputation for the superior quality of their construction and the use of licensed copyrighted game programs.

Both U.S.-based and foreign-based firms producing noncopyrighted, hand-held video games use the same international sources of raw materials and low-cost labor in the Orient. However, the major U.S.-based firm which produces its hand-held video games in the Orient competes on the basis of quality rather than price. The three producers making hand-held video games in the United States market only proprietary games. They remain competitive with imported games despite their higher prices and use of relatively high-cost U.S. labor because of the player appeal of copyrighted programs.

### FUTURE TRENDS

#### Coin-Operated Video Games

The coin-operated video game industry relies on a string of hit games and periodic technological developments to stimulate the interest of game players. It is the consensus among producers and importers of arcade video games interviewed during the investigation that the introduction of several new laser disc games should rejuvenate the industry for approximately 2 years. <sup>1/</sup> It is their opinion, however, that more operators of coin-operated video games will go out of business as most locations find the initial cost of \$4,000 to \$5,000 per game prohibitive. <sup>2/</sup> The current price of 50 cents per play is reportedly necessary for operators to recover their investment in the machines. However, operators' costs are likely to be reduced as they are able to convert their machines to new games simply by changing discs and applying new artwork to the cabinets. Industry sources project that this will enable operators to lower the price per play and appeal to new customers currently leary of the 50-cent charge. Some producers anticipate that the limited number of laser-disc-pressing facilities should keep copyright infringement of the new games to a minimum. Industry participants believe that Japanese and U.S. producers should dominate the world markets for laser disc video games, Competition will most likely be based on the appeal of the games rather than on price. Producers anticipate that once the market is saturated with cabinets equipped with laser disc players and monitors, new sales will be restricted to conversion kits accompanying new laser discs. <sup>3/</sup>

<sup>1/</sup> Michael Schrage, "Video Games Industry Puts Comeback Hopes on Lasers," The Washington Post, Oct. 29, 1983, p. D1.

<sup>2/</sup> Cathleen McGuigan and Peter McAlevy, "Mini-Movies Make the Scene," Newsweek, Aug. 8, 1983, p. 79.

<sup>3/</sup> Bob Davis, "Elaborate New Videodisk Games on the Way, May Benefit Arcades," The Wall Street Journal, Apr. 19, 1983, p. 43.

### Video Game Systems

Most industry observers expect that video game systems which cannot be upgraded to computers will soon become obsolete. <sup>1/</sup> The price war in the home computer market has made home computers available to anyone who can afford a video game system. <sup>2/</sup> Some manufacturers believe that only two producers of video game systems will survive this merger with the home computer market. <sup>3/</sup> Their current advantage over other low-priced home computer suppliers is reportedly the volume and quality of the game software designed for their video game system/home computer hardware and the superior quality of their game controllers.

Some industry observers speculate that the current availability of system adaptors and expansion units is a bridge to the point in the long term when all home computer components will be compatible with hardware by the various producers. <sup>4/</sup> Certain corporate officers indicated that as product differentiation diminishes and price competition continues, home computer producers will stay alert to opportunities to cut costs through the use of overseas assembly or production. They also projected, however, that the intense competition and low profit margins in the home computer market should deter Japanese computer manufacturers from entering this market segment. <sup>5/</sup>

A few industry analysts speculated that a possible long-term development is the integration of a single laser disc player that will function with a household's stereo system, computer system, and video game system, and that will also project movies to be available in laser disc format.

### Game Software

Most industry observers advise that companies currently making only game cartridges will have to act soon to add education and household planning programs to their repertoire or lose their credibility in the home computer market. <sup>6/</sup> Until full compatibility becomes a reality, software manufacturers will still be faced with the dilemma over which hardware to design their cartridges and/or discs to function with. <sup>7/</sup> Already occurring is the trend

<sup>1/</sup> Michael Mella, "A Price War Blasts Open the Home Market," Business Week, June 13, 1983, p. 108.

<sup>2/</sup> Michael Schrage, "Consumer Electronics Has Everything But the Profits," The Washington Post, Aug. 7, 1983, p. G1.

<sup>3/</sup> Laura Landro, "Warner Denies it is Considering Leaving the Computer Business due to Losses at Atari," The Wall Street Journal, Oct. 17, 1983, p. 5; and Mark Halper, "Milton Bradley to Fold Consumer Electronics Subs.," Electronic News, Dec. 12, 1983, p. 86.

<sup>4/</sup> Michael Schrage, "Atari Plans Computers That Use IBM Programs," The Washington Post, Oct. 12, 1983, p. D11.

<sup>5/</sup> Mark Halper, "Japanese Firms in Uphill Fight in U.S. Home CPU Market," Electronic News, Dec. 26, 1983, p. 1.

<sup>6/</sup> Mark Halper, "Atari, Activision Plan to Broadcast Game, CPU Software," Electronic News, Dec. 19, 1983, p. 19.

<sup>7/</sup> Michael Schrage, "Showing Off: Home Computer Makers Target the Masses," The Washington Post, June 12, 1983, p. F1.



for hardware producers to make their own copyrighted software available in a variety of cartridge designs in order to reach the market that has already purchased another company's hardware. 1/ A corporate officer projected that one current video game system/home computer manufacturer is likely to quit making hardware and concentrate on the production of software.

Some analysts indicated that a distant prospect for software producers is that the eventual format of choice for recording programs may be the laser disc instead of cartridges, cassettes, or floppy discs.

#### Hand-Held Video Games

Most industry observers concur that the market for hand-held video games has reached its zenith. The proliferation of game-playing home computers is expected to preclude any significant resurgence in demand. However, industry participants believe that hand-held video games should remain a staple gift item for children, particularly during the Christmas season.

1/ "Warner's 'Atari Unveils Video Games that Run on Rival's Machines," The Wall Street Journal, Oct. 27, 1983, p. 37.

#### APPENDIX A NOTICE OF INVESTIGATION

UNITED STATES INTERNATIONAL TRADE COMMISSION  
Washington, D.C.

(332-160)

A Competitive Assessment of the U.S. Video Game Industry

AGENCY: United States International Trade Commission

ACTION: In accordance with the provisions of section 332(b) of the Tariff Act of 1930 (19 U.S.C. 1332(b)), the Commission has instituted on its own motion investigation No. 332-160 for the purpose of assessing the current and prospective competitiveness of the U.S. video game industry. The study will analyze the rapid growth of the U.S. industry, the growing reliance on overseas assembly of video games, and markets for such games in Canada, Europe, and Japan. The study will also assess conditions of competition between U.S. producers and producers in Europe, Canada, Japan, Taiwan, and Hong Kong.

EFFECTIVE DATE: February 25, 1983

FOR FURTHER INFORMATION CONTACT: Mr. Ralph Watkins or Mr. Rhett Leverett, General Manufactures Division, U.S. International Trade Commission, Washington, D.C. 20436, telephone 202-724-0976, or 202-724-1725, respectively.

WRITTEN SUBMISSIONS: While there is no public hearing scheduled for this study, written submissions from interested parties are invited. Commercial or financial information which a party desires the Commission to treat as confidential must be submitted on separate sheets of paper, each clearly marked "Confidential Business Information" at the top. All submissions requesting confidential treatment must conform with the requirements of section 201.6 of the Commission's Rules of Practice and Procedure (19 CFR 201.6). All written submissions, except for confidential business information, will be made available for inspection by interested parties. To be ensured of consideration by the Commission, written statements should be received by the close of business on October 30, 1983. All submissions should be addressed to the Secretary at the Commission's office in Washington, D.C.

By order of the Commission.

  
Kenneth R. Mason  
Secretary

Issued: March 22, 1983

APPENDIX B

VIDEO GAMES AND COMPONENTS: NONTARIFF BARRIERS EXPERIENCED  
BY U.S. PRODUCERS IN FOREIGN MARKETS





Table B-1.—Video games and components: Number of responses indicating nontariff barriers experienced by U.S. producers in foreign markets, by specified barriers, 1978-83—Continued

Market	Government subsidies and other aids	State trading, government monopolies, and exclusive franchises	Laws and practices which discourage imports	General government policy problems	Health and safety standards	Processing standards	Labeling and container requirements	Product content requirements	Marking requirements	Trademark requirements	Antidumping practices	Consular formalities	Packaging requirements
General problem—			1			1	1	1				1	
Latin America—													
Europe—													
European Community—													
Middle East—													
Southeast Asia—													
Far East—													
Canada—			2										
Mexico—													
Colombia—													
Venezuela—													
Brazil—			2	1									
Argentina—													
Sweden—					2								
Finland—	1				1								
Denmark—													
United Kingdom—													
Ireland—			1										
France—					1				2				
West Germany—													
Poland—													
Portugal—													
Spain—													
Italy—	1												
Greece—			1						1				
Turkey—			1										
Republic of South Africa—													
Africa—													
Saudi Arabia—													
Kuwait—													
Israel—													
India—													
Republic of Korea—													
Taiwan—													
Japan—													
Indonesia—													
Philippines—													
Australia—													
New Zealand—			1										

Table B-1.—Video games and components: Number of responses indicating nontariff barriers experienced by U.S. producers in foreign markets, by specified barriers, 1978-83—Continued

Market	Customs valuation	Documentation requirements	Administrative difficulties	Merchandise classification problems	Regulations on samples, returned goods, and reexports	Lack of copyright protection	Total ban
General problem—							
Latin America—	1					1	1
Europe—						1	
European Community—						1	
Middle East—	1						
Southeast Asia—							
Far East—							
Canada—		1				1	1
Mexico—	2						
Colombia—			1				
Venezuela—		1					
Brazil—		1					
Argentina—		1		1		1	
Sweden—							
Finland—							
Denmark—							
United Kingdom—							
Ireland—							
France—				1		1	
West Germany—							
Poland—							
Portugal—							
Spain—							
Italy—							
Greece—						1	
Turkey—						1	
Republic of South Africa—							
Saudi Arabia—		1				1	
Kuwait—		1					
Israel—							
India—							
Republic of Korea—							
Taiwan—							
Japan—							
Indonesia—				1			
Philippines—							
Australia—							
New Zealand—				1			

APPENDIX C  
ASSESSMENT BY U.S. PRODUCERS AND IMPORTERS OF THE COMPETITIVE POSITION OF  
U.S.-MADE VIDEO GAMES AND COMPONENTS VERSUS THAT OF  
FOREIGN-MADE PRODUCTS



Table C-1.—Coin-operated video games: Assessment by U.S. producers and importers of video games and components <sup>1/</sup> of the competitive position of U.S.-made coin-operated video games versus foreign-made products during 1978-83

Factor of competition	Average rating <sup>2/</sup> of the competitive advantage of U.S.-made coin-operated video games versus products made in—				
	Japan	Taiwan	Hong Kong	European Community	Other
Lower purchase price (delivered)——	1.5	1.5	2.0	2.3	1.
Ability to supply products at various market price levels——	1.5	1.5	2.0	2.3	1.1
Exchange-rate advantage——	1.5	1.4	2.0	3.0	1.0
Quality——	2.3	2.8	3.0	2.3	3.0
Terms of sale——	2.2	2.5	3.0	2.3	3.0
Overall availability (what you want, where and when you want it)——	2.3	2.3	2.5	2.3	2.0
Shorter delivery time——	2.5	2.5	3.0	3.0	3.0
Warranties and service——	2.8	2.8	3.0	3.0	3.0
Historical supplier relationship——	2.4	2.8	3.0	3.0	2.5
Overall competitive advantage——	2.3	2.2	2.0	3.0	1.0

<sup>1/</sup> Data were supplied by 15 U.S. producers and importers assessing products made in Japan; 6 firms, Taiwan; 2 firms, Hong Kong; 3 firms, the European Community; and 2 firms, other sources.

<sup>2/</sup> The questionnaire respondents listed the competitive advantage in each factor as being "domestic," "foreign," or "same." A score of 3 was assigned to a domestic advantage, 2 to same, and 1 to a foreign advantage. An average rating close to 3.0 indicates that a consensus of the respondents listed a domestic advantage; the closer that the average rating is to 1.0, the greater the consensus toward a foreign advantage.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table C-2.—Video game systems: Assessment by U.S. producers and importers of video games and components 1/ of the competitive position of U.S.-made video game systems versus foreign-made products during 1978-83

Factor of competition	Average rating <u>2/</u> of the competitive advantage of U.S.-made video game systems versus products made in—				
	Japan	Taiwan	Hong Kong	European Community	Other
Lower purchase price (delivered)——	1.8	1.5	2.0	2.7	3.0
Ability to supply products at various market price levels——	1.8	1.5	2.4	2.7	3.0
Exchange-rate advantage——	1.8	1.4	2.5	3.0	3.0
Quality——	2.3	2.8	2.0	3.0	3.0
Terms of sale——	2.6	2.5	1.8	2.3	3.0
Overall availability (what you want, where and when you want it)——	2.2	2.3	3.0	3.0	3.0
Shorter delivery time——	2.4	2.5	3.0	2.3	3.0
Warranties and service——	2.8	2.8	2.3	3.0	3.0
Historical supplier relationship——	2.8	2.8	2.3	2.3	3.0
Overall competitive advantage——	2.5	2.2	2.5	3.0	3.0

1/ Data were supplied by 6 U.S. producers and importers assessing products made in Japan; 6 firms, Taiwan; 6 firms, Hong Kong; 3 firms, the European Community; and 1 firm, other sources.

2/ The questionnaire respondents listed the competitive advantage in each factor as being "domestic," "foreign," or "same." A score of 3 was assigned to a domestic advantage, 2 to same, and 1 to a foreign advantage. An average rating close to 3.0 indicates that a consensus of the respondents listed a domestic advantage; the closer that the average rating is to 1.0, the greater the consensus toward a foreign advantage.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table C-3.—Home computers: Assessment by U.S. producers and importers of video games and components 1/ of the competitive position of U.S.-made home computers versus foreign-made products during 1978-83

Factor of competition	Average rating <u>2/</u> of the competitive advantage of U.S.-made home computers versus products made in—				
	Japan	Taiwan	Hong Kong	European Community	Other
Lower purchase price (delivered)——	1.7	1.5	1.4	1.6	2.0
Ability to supply products at various market price levels——	1.9	2.0	2.0	1.6	2.5
Exchange-rate advantage——	1.8	2.0	3.0	2.3	2.5
Quality——	2.6	2.5	3.0	2.7	3.0
Terms of sale——	2.3	2.0	2.2	2.0	2.0
Overall availability (what you want, where and when you want it)——	2.8	2.8	2.5	2.3	2.5
Shorter delivery time——	2.5	2.8	2.3	2.3	2.5
Warranties and service——	3.0	3.0	3.0	3.0	3.0
Historical supplier relationship——	2.7	2.7	3.0	2.3	3.0
Overall competitive advantage——	2.3	2.5	2.0	2.3	2.7

1/ Data were supplied by 7 U.S. producers and importers assessing products made in Japan; 4 firms, Taiwan; 5 firms, Hong Kong; 3 firms, the European Community; and 3 firms, other sources.

2/ The questionnaire respondents listed the competitive advantage in each factor as being "domestic," "foreign," or "same." A score of 3 was assigned to a domestic advantage, 2 to same, and 1 to a foreign advantage. An average rating close to 3.0 indicates that a consensus of the respondents listed a domestic advantage; the closer that the average rating is to 1.0, the greater the consensus toward a foreign advantage.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table C-4.—Video game software: Assessment by U.S. producers and importers of video games and components 1/ of the competitive position of U.S.-made video game software versus foreign-made products during 1978-83

Factor of competition	Average rating <u>2/</u> of the competitive advantage of U.S.-made video game software versus products made in—				
	Japan	Taiwan	Hong Kong	European Community	Other
Lower purchase price (delivered)-----	2.1	2.0	2.0	2.0	3.0
Ability to supply products at various market price levels-----	2.1	2.3	3.0	2.0	3.0
Exchange-rate advantage-----	1.8	2.0	2.7	2.0	3.0
Quality-----	2.7	2.3	2.8	2.3	3.0
Terms of sale-----	2.5	2.3	2.5	2.3	3.0
Overall availability (what you want, where and when you want it)-----	2.8	2.6	2.8	2.7	3.0
Shorter delivery time-----	2.5	2.3	3.0	2.7	3.0
Warranties and service-----	2.8	2.6	2.8	2.7	3.0
Historical supplier relationship-----	2.7	2.5	2.5	2.0	3.0
Overall competitive advantage-----	2.4	2.5	2.6	2.0	3.0

1/ Data were supplied by 8 U.S. producers and importers assessing products made in Japan; 8 firms, Taiwan; 7 firms, Hong Kong; 3 firms, the European Community; and 1 firm, other sources.

2/ The questionnaire respondents listed the competitive advantage in each factor as being "domestic," "foreign," or "same." A score of 3 was assigned to a domestic advantage, 2 to same, and 1 to a foreign advantage. An average rating close to 3.0 indicates that a consensus of the respondents listed a domestic advantage; the closer that the average rating is to 1.0, the greater the consensus toward a foreign advantage.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table C-5.—Hand-held video games: Assessment by U.S. producers and importers of video games and components 1/ of the competitive position of U.S.-made hand-held video games versus foreign-made products during 1978-83

Factor of competition	Average rating <u>2/</u> of the competitive advantage of U.S.-made hand-held video games versus products made in—			
	Japan	Taiwan	Hong Kong	European Community
Lower purchase price (delivered)-----	1.7	1.3	1.2	3.0
Ability to supply products at various market price levels-----	1.5	2.0	1.3	3.0
Exchange-rate advantage-----	1.7	1.8	2.3	-
Quality-----	1.7	2.0	2.0	3.0
Terms of sale-----	2.0	2.4	1.8	3.0
Overall availability (what you want, where and when you want it)-----	2.2	2.8	2.2	3.0
Shorter delivery time-----	2.6	3.0	2.5	3.0
Warranties and service-----	2.2	2.6	2.6	3.0
Historical supplier relationship-----	1.8	2.0	1.8	3.0
Overall competitive advantage-----	1.5	1.5	1.5	3.0

1/ Data were supplied by 8 U.S. producers and importers assessing products made in Japan; 6 firms, Taiwan; 6 firms, Hong Kong; and 1 firm, the European Community.

2/ The questionnaire respondents listed the competitive advantage in each factor as being "domestic," "foreign," or "same." A score of 3 was assigned to a domestic advantage, 2 to same, and 1 to a foreign advantage. An average rating close to 3.0 indicates that a consensus of the respondents listed a domestic advantage; the closer that the average rating is to 1.0, the greater the consensus toward a foreign advantage.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.



Table C-6.—Video game consoles: Assessment by U.S. producers and importers of video games and components 1/ of the competitive position of U.S.-made video game consoles versus foreign-made products during 1978-83

Factor of competition	Average rating <u>2/</u> of the competitive advantage of U.S.-made video game consoles versus products made in—			
	Japan	Taiwan	Hong Kong	European Community
Lower purchase price (delivered)———	2.0	2.0	2.0	3.0
Ability to supply products at various market price levels——	1.8	2.0	2.3	3.0
Exchange-rate advantage———	1.7	1.0	1.5	—
Quality———	2.3	2.6	2.0	3.0
Terms of sale———	2.8	2.4	2.3	3.0
Overall availability (what you want, where and when you want it)———	1.8	2.0	2.3	3.0
Shorter delivery time———	1.8	2.0	2.3	3.0
Warranties and service———	2.8	2.6	2.7	3.0
Historical supplier relationship———	2.5	2.4	2.3	3.0
Overall competitive advantage———	2.3	2.4	2.3	3.0

1/ Data were supplied by 4 U.S. producers and importers assessing products made in Japan; 5 firms, Taiwan; 3 firms, Hong Kong; and 1 firm, the European Community.

2/ The questionnaire respondents listed the competitive advantage in each factor as being "domestic," "foreign," or "same." A score of 3 was assigned to a domestic advantage, 2 to same, and 1 to a foreign advantage. An average rating close to 3.0 indicates that a consensus of the respondents listed a domestic advantage; the closer that the average rating is to 1.0, the greater the consensus toward a foreign advantage.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table C-7.—Video game controllers: Assessment by U.S. producers and importers of video games and components 1/ of the competitive position of U.S.-made video game controllers versus foreign-made products during 1978-83

Factor of competition	Average rating <u>2/</u> of the competitive advantage of U.S.-made video game controllers versus products made in—				
	Japan	Taiwan	Hong Kong	European Community	Other
Lower purchase price (delivered)———	1.3	1.4	1.5	3.0	1.0
Ability to supply products at various market price levels——	2.0	1.4	1.5	3.0	1.0
Exchange-rate advantage———	1.4	1.0	1.3	3.0	2.0
Quality———	2.2	2.4	2.3	2.3	2.0
Terms of sale———	2.5	2.3	2.3	3.0	1.0
Overall availability (what you want, where and when you want it)———	2.2	1.6	1.5	3.0	2.0
Shorter delivery time———	2.3	2.0	2.3	2.7	2.0
Warranties and service———	2.5	2.6	2.5	3.0	2.0
Historical supplier relationship———	2.7	2.4	2.5	3.0	—
Overall competitive advantage———	2.0	1.6	1.5	3.0	1.0

1/ Data were supplied by 6 U.S. producers and importers assessing products made in Japan; 7 firms, Taiwan; 4 firms, Hong Kong; 3 firms, the European Community; and 1 firm, other sources.

2/ The questionnaire respondents listed the competitive advantage in each factor as being "domestic," "foreign," or "same." A score of 3 was assigned to a domestic advantage, 2 to same, and 1 to a foreign advantage. An average rating close to 3.0 indicates that a consensus of the respondents listed a domestic advantage; the closer that the average rating is to 1.0, the greater the consensus toward a foreign advantage.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table C-8.—Game logic boards: Assessment by U.S. producers and importers of video games and components 1/ of the competitive position of U.S.-made game logic boards versus foreign-made products during 1978-83

Factor of competition	Average rating <u>2/</u> of the competitive advantage of U.S.-made game logic boards versus products made in—			
	Japan	Taiwan	Hong Kong	European Community
Lower purchase price (delivered)———	1.4	1.8	2.5	3.0
Ability to supply products at various market price levels——	1.6	1.9	3.0	3.0
Exchange-rate advantage———	1.6	1.2	2.0	—
Quality———	2.1	2.6	2.5	3.0
Terms of sale———	2.6	2.5	2.0	3.0
Overall availability (what you want, where and when you want it)———	2.3	2.1	3.0	3.0
Shorter delivery time———	2.4	2.1	3.0	3.0
Warranties and service———	2.8	2.8	2.5	3.0
Historical supplier relationship———	2.4	2.6	2.5	3.0
Overall competitive advantage———	1.8	1.6	3.0	2.0

1/ Data were supplied by 14 U.S. producers and importers assessing products made in Japan; 8 firms, Taiwan; 2 firms, Hong Kong; and 2 firms, the European Community.

2/ The questionnaire respondents listed the competitive advantage in each factor as being "domestic," "foreign," or "same." A score of 3 was assigned to a domestic advantage, 2 to same, and 1 to a foreign advantage. An average rating close to 3.0 indicates that a consensus of the respondents listed a domestic advantage; the closer that the average rating is to 1.0, the greater the consensus toward a foreign advantage.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table C-9.—Custom-made video game computer chips: Assessment by U.S. producers and importers of video games and components 1/ of the competitive position of U.S.-made custom-made video game computer chips versus foreign-made products during 1978-83

Factor of competition	Average rating <u>2/</u> of the competitive advantage of U.S.-made custom-made video game computer chips products made in—				
	Japan	Taiwan	Hong Kong	European Community	Other
Lower purchase price (delivered)———	1.3	1.7	2.5	2.0	2.0
Ability to supply products at various market price levels——	1.7	2.0	2.5	2.0	2.0
Exchange-rate advantage———	1.6	1.5	2.0	2.5	2.0
Quality———	2.3	2.3	2.5	2.0	2.0
Terms of sale———	2.5	2.0	2.5	2.0	2.0
Overall availability (what you want, where and when you want it)———	2.5	2.7	3.0	3.0	3.0
Shorter delivery time———	2.3	2.0	2.5	2.5	2.0
Warranties and service———	2.5	2.7	2.5	2.0	2.0
Historical supplier relationship———	2.6	2.3	2.5	2.5	2.0
Overall competitive advantage———	2.0	2.0	2.5	2.5	2.0

1/ Data were supplied by 6 U.S. producers and importers assessing products made in Japan; 3 firms, Taiwan; 2 firms, Hong Kong; 2 firms, the European Community; and 1 firm, other sources.

2/ The questionnaire respondents listed the competitive advantage in each factor as being "domestic," "foreign," or "same." A score of 3 was assigned to a domestic advantage, 2 to same, and 1 to a foreign advantage. An average rating close to 3.0 indicates that a consensus of the respondents listed a domestic advantage; the closer that the average rating is to 1.0, the greater the consensus toward a foreign advantage.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table C-10.—Keyboards for home computers: Assessment by U.S. producers and importers of video games and components <sup>1/</sup> of the competitive position of U.S.-made keyboards for home computers versus foreign-made products during 1978-83

Factor of competition	Average rating <sup>2/</sup> of the competitive advantage of U.S.-made keyboards for home computers versus products made in—			
	Japan	Taiwan	Hong Kong	European Community
Lower purchase price (delivered)———	1.0	1.0	1.0	2.0
Ability to supply products at various market price levels——	1.0	1.0	3.0	2.0
Exchange-rate advantage———	1.0	1.0	3.0	3.0
Quality———	2.5	2.0	1.0	3.0
Terms of sale———	2.0	1.0	3.0	2.0
Overall availability (what you want, where and when you want it)———	3.0	3.0	1.0	2.0
Shorter delivery time———	2.5	1.0	1.0	2.0
Warranties and service———	3.0	3.0	3.0	2.0
Historical supplier relationship———	2.0	2.0	3.0	2.0
Overall competitive advantage———	2.5	1.0	1.0	3.0

<sup>1/</sup> Data were supplied by 2 U.S. producers and importers assessing products made in Japan; 1 firm, Taiwan; 1 firm, Hong Kong; and 1 firm, the European Community.

<sup>2/</sup> The questionnaire respondents listed the competitive advantage in each factor as being "domestic," "foreign," or "same." A score of 3 was assigned to a domestic advantage, 2 to same, and 1 to a foreign advantage. An average rating close to 3.0 indicates that a consensus of the respondents listed a domestic advantage; the closer that the average rating is to 1.0, the greater the consensus toward a foreign advantage.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.

Table C-11.—Disc drives for home computers: Assessment by U.S. producers and importers of video games and components <sup>1/</sup> of the competitive position of U.S.-made disc drives for home computers versus foreign-made products during 1978-83

Factor of competition	Average rating <sup>2/</sup> of the competitive advantage of U.S.-made disc drives for home computers produced in—				
	Japan	Taiwan	Hong Kong	European Community	Other
Lower purchase price (delivered)———	3.0	3.0	2.0	3.0	
Ability to supply products at various market price levels——	3.0	3.0	3.0	3.0	
Exchange-rate advantage———	3.0	3.0	3.0	3.0	
Quality———	3.0	3.0	3.0	3.0	
Terms of sale———	3.0	3.0	2.0	2.5	
Overall availability (what you want, where and when you want it)———	3.0	3.0	3.0	2.5	
Shorter delivery time———	3.0	3.0	3.0	2.5	
Warranties and service———	3.0	3.0	3.0	2.5	
Historical supplier relationship———	3.0	3.0	3.0	2.5	
Overall competitive advantage———	3.0	3.0	3.0	2.5	3

<sup>1/</sup> Data were supplied by 2 U.S. producers and importers assessing products made in Japan; 1 firm, Taiwan; 2 firms, Hong Kong; 2 firms, the European Community; and 2 firms, other sources.

<sup>2/</sup> The questionnaire respondents listed the competitive advantage in each factor as being "domestic," "foreign," or "same." A score of 3 was assigned to a domestic advantage, 2 to same, and 1 to a foreign advantage. An average rating close to 3.0 indicates that a consensus of the respondents listed a domestic advantage; the closer that the average rating is to 1.0, the greater the consensus toward a foreign advantage.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.



Table C-12.—Cassette recorders for home computers: Assessment by U.S. producers and importers of video games and components <sup>1/</sup> of the competitive position of U.S.-made cassette recorders for home computers versus foreign-made products during 1978-83

Factor of competition	Average rating <sup>2/</sup> of the competitive advantage of U.S.-made cassette recorders for home computers versus products made in—		
	Japan	Hong Kong	European Community
Lower purchase price (delivered)-----	3.0	1.0	1.0
Ability to supply products at various market price levels-----	3.0	1.0	1.0
Exchange-rate advantage-----	3.0	3.0	3.0
Quality-----	3.0	1.0	3.0
Terms of sale-----	3.0	1.0	2.0
Overall availability (what you want, where and when you want it)-----	3.0	1.0	2.0
Shorter delivery time-----	3.0	1.0	2.0
Warranties and service-----	3.0	3.0	2.0
Historical supplier relationship-----	3.0	1.0	2.0
Overall competitive advantage-----	3.0	1.0	1.0

<sup>1/</sup> Data were supplied by 1 U.S. producer assessing products made in Japan; 1 firm, Hong Kong; and 1 firm, the European Community.

<sup>2/</sup> The questionnaire respondents listed the competitive advantage in each factor as being "domestic," "foreign," or "same." A score of 3 was assigned to a domestic advantage, 2 to same, and 1 to a foreign advantage. An average rating close to 3.0 indicates that a consensus of the respondents listed a domestic advantage; the closer that the average rating is to 1.0, the greater the consensus toward a foreign advantage.

Source: Compiled from data submitted in response to questionnaires of the U.S. International Trade Commission.